Going metric: the first 5 years 1965-69

The first report of the Metrication Board 1970

London: Her Majesty's Stationery Office 1970

Metrication Board
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Chairman's foreword

As one who has to unlearn the imperial units so laboriously acquired at school, I envy the younger generation who will be disencumbered: they will be the beneficiaries of what we are trying to do.

This Report marks the end of the beginning. The decision that Britain should "go metric" was made in 1965. The Board itself came into existence in May, 1969, but it was taking over a going concern, thanks to the initiatives already taken and the progress already made in many sectors of the economy, and by many institutions.

This year, 1970, is the watershed. The Metrication Board is well established and equipped to help in the orderly, and, I like to think, painless transition, from the folk-lore of measurement to a simpler and coherent system of metric units, and to a common numerical language in which we can talk business to the rest of the world.

In accepting the historical compulsions of going metric, Britain has relied on the voluntary principle. There are no arbitrarily decreed "dead-lines" and no sanctions except the inescapable one that those who get out of step or drag their feet will find themselves being left behind.

Big industries are our allies: small businessmen are our friends. The Board is grateful to its allies and properly concerned for its friends.

Big or small, the first to concert their plans within their sector, with their suppliers and with their consumers, will reap the predictable benefits which metrication can produce. Costs are a function of efficiency. Large figures have been "dreamed up" as to the overall costs of metrication. They have no relation to the practical experience of those who have gone metric and who have demonstrated that, with good management, the costs are manageable. Metrication will, as progressive firms have already shown, provide an opportunity for reconsidering processes. The trading advantages which can be secured and the increased productivity and economies from the simplified system will, in the not-so-long term, offset the cost of re-designing, re-tooling and re-training.

Metrication cannot, and should not, be used as a pretext for increasing costs to the consumer. When I buy ten litres of petrol, I would resent paying for the pump as well. Explicitly costs must lie where they fall.

In energizing the changes which our industry and commerce have to make, the Board confidently expects that all Departments of Government will back the decision which has been made, and will set examples both in specifying metric in procurement and in encouraging local authorities and other public bodies to move as fast as the new circumstances demand.

Education is critical. A new generation will have to *think* metric. This must be reflected throughout the whole educational system on a

time-scale consistent with having a Metric Britain in 1975. Scotland has already specified a start and finish time-table and it behoves England and Wales to be as well prepared.

"Going Metric" is no longer a question of "whether" but "when". We, in Britain, have made our decision. The rest of the Commonwealth is giving up the traditional imperial units: the United States is now considering the advantages of making the change. The whole world will predictably be metric by the end of the 70s.

To The Rt Hon Anthony Wedgwood Benn, MP, Minister of Technology

We have the honour to submit to you the first Annual Report of the Board, which covers the work of the Board from its appointment until 31st December, 1969.

We have the honour to be,

Sir,

RITCHIE-CALDER *Chairman* BESSBOROUGH *Deputy Chairman*

17th March, 1970

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1: Introduction

Britain will be a metric country before 1975. In 1965 the Metrication Decade was launched. At mid-term, the progress made confirms that forecast and justifies the confidence placed on voluntary initiative. The main purpose of this report is to give as full a picture as possible of what has been achieved in the last five years and to look forward to the changes planned to take place in 1970 and 1971. 1.1

At the end of 1969 the Board had only been in existence some six months. The progress so far achieved therefore reflects mainly the efforts of others. In Chapter 2 we outline the background of the decision of the Government and of industry that the country should change over to the use of metric units and of the later decision to establish the Metrication Board. 1.2

In Chapter 3 we discuss the Board's responsibilities. It is our task to see that the changeover proceeds as briskly and as smoothly as possible. We are not an executive body, nor do we have statutory or mandatory powers. We do not dictate to the industrial and non-industrial sectors how they shall plan the changeover, nor do we make decisions about the units of the metric system to be adopted. We consult, advise, inform, stimulate and co-ordinate. We are required to give coherence to the whole process, reassuring and supporting those sectors of the economy which are showing initiative in going metric, and encouraging those which are still hesitant and over-cautious. The chapter emphasises the important role of the Steering Committees we have established to enable us to carry out our responsibilities. 1.3

The first task of the Steering Committees has been to find out what was happening in the various sectors. We began with no central record. We have had to build one up in as much detail as practicable. We discuss the essential role of trade associations in carrying forward metrication. In the concluding paragraphs of Chapter 3 we describe the organisation of the Board's staff and the costs of our work during 1969. 1.4

Education in all its varied forms has a critically important role in bringing about this fundamental change from our customary system of weights and measures. This is described in Chapter 4, with particular emphasis on the work of primary schools and, at a later stage, of the examining bodies, both general and technical, in setting the pace. We draw attention to the contribution of the Royal Society, the Schools Council, and, in Scotland, the Consultative Committee on the Curriculum and the Examination Board, and of the Technical Examining Bodies. The broadcasting organisations and the voluntary bodies concerned with adult education are essential elements in this whole educational process. 1.5

Major and evident changes will occur when our transport systems transfer to metric. The ramifications of this are outlined in Chapter 5 as well as the arrangements made to attain effective co-ordination. The essential problem is that of synchronising the changes in freight movements. There are, in 1.6

addition, the changes in speed limits, in vehicle licensing and taxation and other vehicle regulations and in road signs. The changes for shipping are reviewed, including the training needs. Metrication in civil aviation is very much governed by international agreements.

The fuel and power industries are in the main publicly owned. Their plans for changing are set out in Chapter 6. Our main concern is, however, with the adoption of common measurement units for power and energy for all types of fuel and fuel-burning installations. 1.7

One of the areas where the effect of metrication will be immediately evident is in land surveys, land planning and mapping. The changes here are described in Chapter 7. 1.8

The changes in agriculture are described in Chapter 8. The National Farmers' Union has assumed the co-ordinating function for all the interests concerned. The impact of the change on farming will not be great nor the changeover difficult to make. The likely metric units are few and simple. The principal effects will be in accounting, in performance assessment, in marketing, and in the statistical bases of agricultural support. The most immediate need is to establish a target date for planning purposes. We have given a lead on this. 1.9

Chapter 9 sets out the probable changes in the fishing industry. Fishing itself is already to some extent metric and metrication of the shipbuilding industry will extend to fishing vessels. The area where significant changes are required is in marketing. The White Fish Authority and the Herring Industry Board have jointly taken the lead. The chapter outlines steps being taken to tackle this range of problems to which metrication is incidental. 1.10

The Forestry Commission has drawn up a timetable for introducing metric change into forestry. The programme is set out in Chapter 10. The main changes are in measurement of timber and its marketing. 1.11

Chapters 11 to 15 describe the progress made in the main industrial sectors in planning and implementing the change to metric. The sectors described are industrial materials, construction, engineering, printing and publishing and food and consumer products. In each case the timetables being followed, the progress to date and the obstacles so far identified are indicated. Special attention is given to the conversion of weighing machines, a problem which will affect many sectors. The main industrial programmes are summarised in Appendix D. 1.12

In Chapter 16 we attempt an analysis of the size and nature of the problems which will face the retailer and the consumer when metric changes extend into the retail trade on a substantial scale. The examination shows that measurement in the shop only arises in a limited and decreasing portion of the retail trade. We examine closely the retailing of milk, beer and petrol. We stress the burden of responsibility which inevitably falls on retailers in explaining the changes, and therefore the importance of making them familiar with the metric units which they will be using. 1.13

In Chapter 17 we draw attention to the indispensable part which industrial training and retraining must play in making possible the changeover by industry and commerce to metric units. The main task falls on the individual undertaking, but the help of Technical Colleges, the Industrial Training Boards and the Government Training Centres will be essential. 1.14

Throughout our report we make reference to the various ways in which Government, the local authorities and other public bodies are called upon 1.15

to assist in bringing the change about. In Chapter 18 we seek to focus these issues. We draw particular attention to the role of Government Departments in initiating required legislative changes, in using their purchasing power to accelerate the rate of change, and in their sponsorship function to encourage the industries and services for which they are responsible to be zealous in pressing forward with the metric changes. Departments must also give the necessary instructions and guidance to local authorities. The latter are responsible for a wide range of services of immediate concern to the general public: education, housing, health and welfare, roads, police and fire services, and weights and measures inspection. Through the influence of these services and through their very large purchases, local authorities can have a very direct influence on the rate of change.

In Chapter 19 we outline our responsibility for making widely known the system of metric units to be used in this country. We are not, of course, responsible for defining the units nor for deciding those which shall be used. We have, nevertheless, a responsibility for removing uncertainty and remedying confusion. This we are doing. Another issue on which we have been asked for guidance is decimal notation. This contentious matter is the responsibility of the British Standards Institution. Nevertheless, we urge that the Government should quickly establish standard practice for Government Departments. 1.16

From the outset we have been concerned to establish whether it would be practicable to arrive at well founded assessments of the costs and of the benefits of the metric change. We seek in Chapter 20 to explain our position on these important issues. 1.17

In Chapter 21 we describe how we are fulfilling our responsibility for making the metric change understood as widely as possible, through our own information and publicity programmes, as well as by encouraging and complementing the efforts of others. Immediately our main emphasis is on the changes in industry. Progessively there will be a shift to the major task of making the general public familiar with the pending changes. 1.18

Our conclusions are summarised in Chapter 22. 1.19

We would not wish our confidence in the progress of metrication to be misread as complacency. We know that there will be difficulties, but we are sure that they will not be insuperable. A task which might have appeared formidable in its total complexity becomes very much less so when broken down into its elements. This is what our report seeks to do. The picture, with its recognisable but remediable shortcomings, which we are now able to draw of the state of progress in the country as a whole is the foundation of our optimism. It may also reassure those who have been in the forefront and who may have feared lack of support from other sectors. They will see that these fears are groundless. The country is now advancing on a broad front towards its metric objectives. 1.20

2: The background

Metrication is not a new concept in the United Kingdom. The metric system was officially recognised by the Metric Act of 1864, permitting its use for scientific and certain other purposes, but not for trade or commerce. By 1871 opinion had progressed to the extent that a Bill which would have made the system compulsory for all purposes after two years was rejected by the House of Commons by only five votes. It was not until 1897 that the Weights and Measures (Metric System) Act made it lawful to use the system in trade and commerce. That change made little practical difference. The system has been in general use among British scientists for a long time. Commercial use has, however, been largely restricted until recently to those occasions when export customers ordered products to metric specifications and when purchases from abroad required the acceptance of metric products. 2.1

1950 The Hodgson Report

The present phase of metrication can be dated from the Report of the Committee on Weights and Measures Legislation (the Hodgson Committee) Cmd. 8219, made in December, 1950. The Committee examined the issues in detail and came to the unanimous conclusion that the metric system was a better system of weights and measures than the imperial; that a change from the imperial to metric for all trade purposes was sooner or later inevitable; that a continuance of the option to use either the metric or the imperial until the inevitable came about would cause in the long run more inconvenience than an ordered change within a specified period; and that the long term advantages which would flow from an organised change in the near future would far outweigh the inconveniences of the change itself. The Committee made two important provisos: that the change should only be done in concert with those countries of North America and the Commonwealth which based their units on the yard and the pound; and that, prior to the metric change, the currency should be decimalised. 2.2

1950-1960

In 1950 British industry and commerce were opposed to the change at that time, mainly because of the continued adherence to the imperial system by most of the Commonwealth and by the United States of America, our biggest market. Nearly ten years later, in 1960, a Committee was appointed jointly by the British Association for the Advancement of Science and the Association of British Chambers of Commerce to consider whether or not it was desirable to adopt a decimal system of coinage and a metric system of weights and measures. Its report showed that a majority of industry was still against a change to metric units, although the Committee recognised that the world trend was towards the metric system and recommended that the situation should be reviewed every two years. Since then, as more and more countries including major Commonwealth countries have decided to change to the system and the volume of the trade of metric countries has increased, both absolutely and relatively, the strength of the case for an early change has grown. 2.3

1963-1965 Industry's Change of Mind

The shift in the balance of opinion became very apparent in 1963. The British Standards Institution then published the results of a very wide 2.4

consultation with industry. This showed a large majority firmly in favour of starting a change to the metric system without delay and without waiting for the rest of the Commonwealth and the United States. This assessment was reinforced in 1965 when the President of the Federation of British Industries informed Ministers that a majority of the members of the Federation, both in number of firms and in the total size of their business, was in favour of the adoption of the metric system as the primary and ultimately the only method of measurement to be used in Britain. The Federation suggested that the time was appropriate for general Government support for the principle and timing of this change.

1965 The Government's Decision

2.5 On 24th May, 1965, the then President of the Board of Trade gave the Government's response in a statement in the House of Commons (*Hansard*, 24th May, 1968, Volume 713, Columns 32 and 33):

"The Government are impressed with the case which has been put to them by the representatives of industry for the wider use in British industry of the metric system of weights and measures. Countries using that system now take more than one-half of our exports; and the total proportion of world trade conducted in terms of metric units will no doubt continue to increase. Against that background the Government consider it desirable that British industries on a broadening front should adopt metric units, sector by sector, until that system can become in time the primary system of weights and measures for the country as a whole. . . .

We shall also encourage the change to the metric system as and when this becomes practicable for particular industries, by seeking to arrange that tenders for procurement by the Government and other public authorities shall be in terms of metric specifications.

Practical difficulties attending the changeover will, of course, mean that this process must be gradual, but the Government hope that within ten years the greater part of the country's industry will have effected the change. To this end they propose to establish a small standing joint committee of representatives of Government Departments and Industry to facilitate the removal of obstacles and to keep under constant review the progress which is being achieved. . . ."

1966 The Standing Joint Committee on Metrication

2.6 In pursuance of this policy the Minister of Technology set up early in 1966 the Standing Joint Committee on Metrication. The prime task of the Committee was to co-ordinate Government and industrial policies and to make recommendations to the Minister, should it be generally agreed that more positive Government action was required in any particular area. Over the next two years the Committee considered a number of specific problems relating to metrication in industry, including the implications of such a change for education, legislation and Government purchasing. It reported to the Minister of Technology in June, 1968. On 26th July, 1968, he announced the acceptance of the report of the Committee in a statement in the House of Commons (*Hansard*, 26th July, 1968, Volume 769, Columns 1167-1171):

"In May, 1965, the Government announced their support for the adoption of the metric system of weights and measures in industry which had been proposed by the Federation of British Industries. They also accepted that the metric system would spread outwards from industry and become in time the primary system for the country as a whole. The Government consider that this will bring substantial advantages. More than three-quarters of world trade is now conducted in metric units. All the Commonwealth countries except Canada have changed to the metric system or are about to do so, and studies are in progress in the United States and Canada.

The background

In 1966, my predecessor appointed the Standing Joint Committee on Metrication, representing industrial management, the trade unions and the Government, to encourage, assist and review the progressive adoption of the metric system by British Industry. A report by that Committee will be published today by Her Majesty's Stationery Office. . . .

The Report makes three main recommendations. First, that manufacturing industry can make the change efficiently and economically only if the economy as a whole moves in the same direction on a broadly similar time-scale, and in an orderly way. Second, that a Metrication Board should be established to guide, stimulate and co-ordinate the planning for the transition for the various sectors of the economy. Third, that any legal barrier to the use of the metric system for all purposes within the United Kingdom should be removed.

The Government accept the recommendation that a Metrication Board should be set up as soon as possible. Every sector of the economy need not move at the same pace. But there will be unnecessary confusion and expense, and great difficulties for industry, unless there is central machinery for co-ordinating the programmes of change for the various sectors.

The Board will be advisory. The adoption of the metric system must be gradual, through democratic procedures based on the widest consultation. Membership of the Board will, therefore, reflect the interests of industry, the distributive trades, education—for which there are important implications—and, particularly, the general public and consumers. The Board will need to ensure that the distributive trades and consumers are consulted and have ample notice of proposed changes.

No compulsory powers will be sought. There can be no question of compensation; the costs of adopting metric weights must lie where they fall.

The Government agree that programmes for the different sectors of the economy can be properly co-ordinated only if there is some general guidance on timing. They therefore accept the end of 1975 as the target date for all provisional programmes, with the qualification that if this date proves to be unreasonable for any particular sector, the programme may aim at an earlier or later date. An initial task of the Metrication Board will be to submit to the Government an appreciation for each sector, including, so far as practicable, the costs and other considerations involved. In the light of this, programmes can be drawn for individual sectors. The Government will not be committed to endorse the programme for any sector of the economy before final proposals for that sector are submitted.

The Government accept that legislation will be needed to remove obstacles to the adoption of metric units and to define the units to be used. Further consultation is, however, needed before the timing of the legislation can be decided. Arrangements will be made to co-ordinate the interests of Government Departments so that they may play their full part in the consideration of programmes and so that the public sector keeps in step as the programmes develop.

The educational system will need to keep pace with, and to some extent anticipate, changes. The conversion will stimulate industrial and commercial modernisation and the rationalisation of production by variety reduction. We must also use it to help our export trade by harmonising our standards with those of our customers overseas.

The adoption of the metric system in the United Kingdom will represent a major change affecting many aspects of the national life, and I hope that

publication of this report will lead to a wide public discussion of the issues involved."

International Advance of the Metric System

Thus the issues raised by the change for the United Kingdom have been carefully considered through recent years. The world trend towards the metric system has continued. Between 1963, when the report of the British Standards Institution first showed a majority of industry in favour of metrication, and the present day, Australia, Bahrein, Canada, Ghana, the Republic of Ireland, Kenya, Kuwait, New Zealand, Pakistan, South Africa, Swaziland, Tanzania and Uganda have decided to adopt the metric system. The Congress of the United States of America has commissioned a comprehensive study to determine the impact of increased world-wide use of the metric system of weights and measures upon the American economy. There is thus a prospect that before the end of the seventies the whole world will have decided to adopt the metric system. 2.7

3: The general approach of The Board

We are required by our terms of reference to facilitate the transition from the use of existing systems of weights and measures in the United Kingdom to the metric system. Our task is to give guidance and help to all concerned with making plans for the change; to ensure that the plans in each sector of the economy are consistent with those in other relevant sectors; to persuade any laggards to take action; and to inform the public what changes are taking place and what they will mean. 3.1

The Royal Society

In approaching our work we were very conscious of the considerable work that had already been done before the Board had been set up. The Royal Society, in the tradition of British science, has taken a leading role in achieving and promoting the international coherent system of metric units. A notable contribution of the Society is through its guidance on the names, abbreviations and symbols for physical quantities. In 1968 the Society held a conference of editors of scientific journals to secure the adoption of a standard United Kingdom practice in scientific publications. The Society also held three national conferences of educational authorities to consider the adoption of the International System of Units (SI) in universities and in schools and in public examinations. It subsequently published booklets embodying the conclusions and recommendations of these conferences. This influential initiative marked the first stage in a series of decisions on curricula and examinations in universities, colleges of education, technical colleges and professional institutions to change to metric units. 3.2

The Role of the British Standards Institution

In the four years following the statement by the President of the Board of Trade in May, 1965, important sectors of British industry, with the help of the British Standards Institution, had made notable progress in planning the change-over. The main function of the British Standards Institution is to establish technical standards. The provision of metric standards was, and is, for many sectors of manufacturing industry a necessary condition for the change to metric units. The Government asked the Institution to pay special attention to this work and to press on with it as speedily as possible. By the end of 1969 nearly 1600 metric standards had been issued. These included most of the key standards for materials and components required for metric production. This work, carried on through its established network of technical committees covering the whole range of British industry, made the Institution, prior to the setting up of the Metrication Board, the focal point for consultations about the methods and timing of the change. 3.3

Some specially appointed metric panels, manned by leading figures from the industry concerned, were organised. Programmes for the timing of the change in four key industrial sectors, the construction industry, the engineering industries, the electrical industry and the marine industry, were drawn up and published by the Institution. Each of these programmes covered a wide industrial range and a great diversity of production. They were necessarily very general. They have provided the framework for more detailed programmes by particular sectors in the industries concerned. 3.4

They also formed the basis for commercial planning decisions by individual firms and undertakings.

The Board's Task

Our first report is therefore not so much a record of our own achievements (since the Board came into existence only in the middle of 1969) as an appreciative account of the results of a number of years' effort by many institutions and of the initiatives taken by Government Departments, industrial organisations and individual firms. Our first task was to find out how much progress had been made since 1965. When we began our work there was no comprehensive record of progress on which we could draw. Such a record is indispensable to carrying out our terms of reference. We have therefore made the collection of this information our first priority. 3.5

On the basis of this information we are able to begin to perform one of our main responsibilities. This is to ensure that planning for the change in each important sector of the economy is co-ordinated so that all related sectors can move forward on a broad front in an orderly way and so that progress in one sector is not impeded by lack of progress in another sector or by other obstacles, legal or technical. 3.6

Although considerable progress had been made in some major sectors before we began our work, there were other sectors which had taken little or no action. In these areas, particularly where initiative had been lacking, there is a need to provoke action. Usually this means that a body representative of the interests concerned should get to work to draw up a realistic programme to which individual firms could work. 3.7

In his statement of 26th July, 1968, the Minister of Technology said that the adoption of the metric system in the United Kingdom would represent a major change, affecting many aspects of the national life. At the outset we recognised that the transition will proceed smoothly only if the nation is informed of the changes which are being made, their crucial importance for the future of the country and their likely impact on day-to-day life. We need to ensure that the right climate of opinion is created and that the progress of metrication is not impeded by unthinking resistance to change and ignorance of what is involved. There has been a good deal of perplexity about the nature of the units which constitute the International System which the Government decided should be adopted as the basis of the change to metric. We therefore felt it necessary, as one of our first tasks, to issue a quite simple guide to the metric units which would be used in everyday life. This responsibility is referred to in more detail in Chapter 19. 3.8

The Board's Membership

The appointment of the Chairman and the Director of the Board was announced on 29th January, 1969, and the appointment of the Deputy Chairman on 24th February, 1969. Eight other Members were appointed on 12th May and the Board held its first meeting on 28th May. Subsequently four further Members were added to the Board. One Member, Mr. D. H. Lewis, died on 17th November, 1969. The Board now has fourteen Members. We held six meetings during 1969. The present membership and terms of reference are set out in Appendix A. 3.9

The Steering Committees

At our first meeting we decided to set up eight Committees of the Board which would assume responsibility for the most important sectors. The Committees were made responsible for Agriculture, Forestry, Fisheries and Land; for the Distribution, Food and Consumer Goods Industries; for Education and Industrial Training; for the Engineering Industries; for the Fuel and Power Industries; for the Industrial Materials and Construction Industries; for the Transport and Communication Industries; and for Information Policy. There were 26 meetings of these Committees during 1969. 3.10

Each Committee is under the chairmanship of a Member of the Board, who is supported by at least one other Member of the Board. The other members of each Committee were chosen from people of standing who had an interest in changing to the metric system and who were in a position to advise the Committee to which they were appointed on a range of problems in the relevant sector. We consulted the Confederation of British Industry and, in appropriate cases, some of the principal trade associations, before making the appointments. Members were, however, appointed in a personal capacity, not as representatives of particular industries or organisations. Quite apart from the importance of recruiting people who could give independent advice, it would have been impracticable to appoint members in a representative capacity: the Committees would then have reached an unmanageable size. Organisations which are concerned with metrication in a particular industry are encouraged to communicate with the appropriate Steering Committee through the Secretariat. The British Standards Institution was invited to appoint a representative to each Committee and appropriate Government Departments to appoint assessors. The present membership of each of the Committees and their areas of responsibility are set out in Appendix B. 3.11

Each of the Steering Committees began by making investigations to discover what was happening to foster the changeover in its sector, and what further action was necessary. The next step has been to identify whether any organisation, trade association or federation has accepted responsibility for developing a metrication programme or programmes for the sector. The Steering Committees have sought to identify what the sectors require public authorities to do, whether by way of provision of standards, changes in legislation and regulations, or in purchasing policies or training and retraining. Not least important has been their consideration of what help the Board should be recommended to give, by providing information, publicity or other forms of help, to speed action on an agreed programme. 3.12

Information Policy

We have already referred to the critical importance of keeping the nation sufficiently informed if the change to metric is to be achieved smoothly. This is the one area in which the Board has an executive function as distinct from its consultative and advisory role. All the Steering Committees are concerned with this task but the Information Policy Committee has the specific responsibility of advising on a coherent strategy and a set of publicity and information programmes to enable us to fulfil our responsibility for creating an understanding of the changes on which the nation has already embarked. 3.13

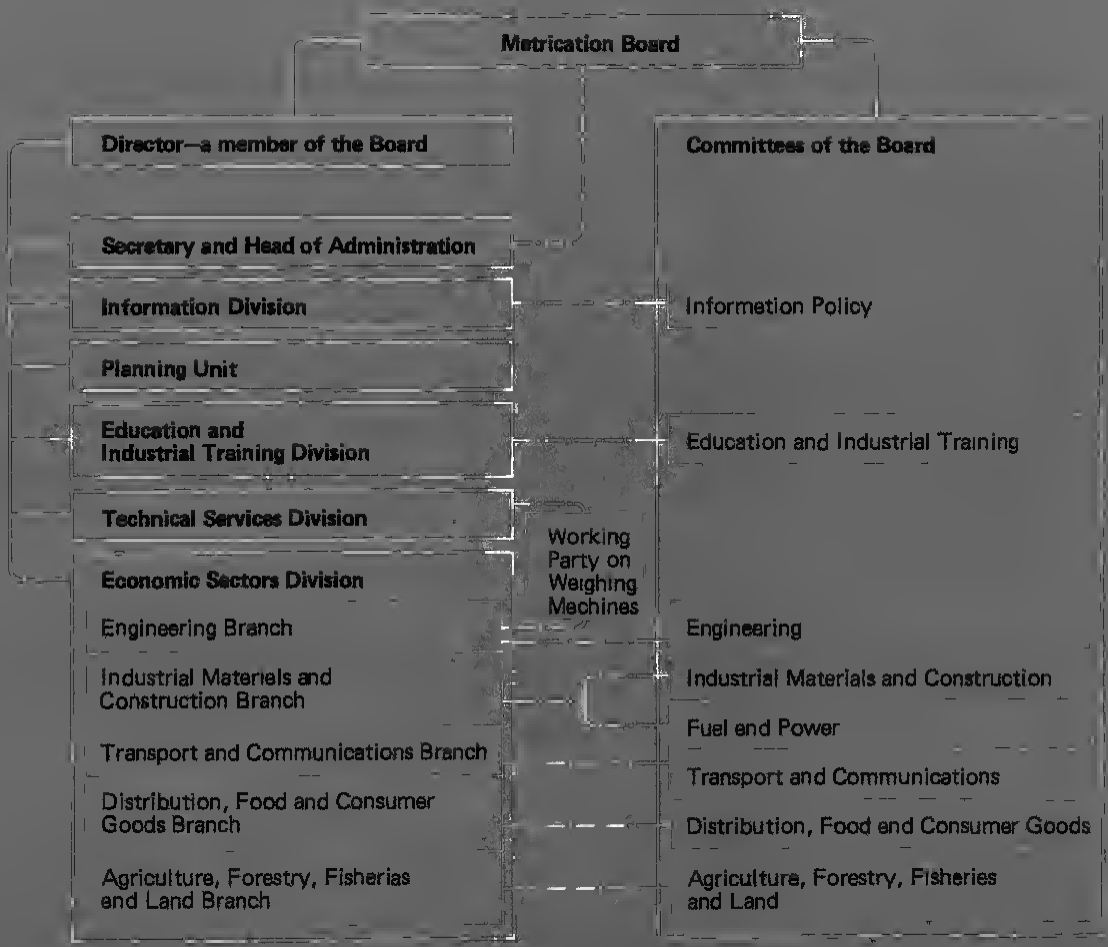
The Steering Committees quickly found that there was a large number of well-defined programmes, both in industry and in other sectors of the economy, already being acted upon. Many of these had been produced by trade associations. But such progress was far from universal. Each Steering Committee has been concerned that there should be effective working parties or committees so that the whole of its area of responsibility is covered. When initiative has been found lacking the Steering Committees have stimulated the setting up of a body, representative of the interests concerned, to draw up a realistic programme to which individual firms could work. Appendix D shows the metrication programmes which have so far been identified. 3.14

Relationship with Trade Associations

Each Committee works closely with trade associations and other bodies concerned with the change to the metric system. Trade associations, with their detailed knowledge of the interests which they represent, have a particularly important role to play in all this. Many of them have been active in preparing broad programmes for the guidance of their members. This is not their only role. By collaborating with associations representing 3.15

Figure 1

Organisation of the Metrication Board



those who supply their members with materials and components they can help to ensure that supplies are available in metric dimensions when they are needed. They can act as the focal point for co-ordinating the needs of their members for those supplies so that producers are encouraged to implement their plans. They can participate actively in the technical committees of the British Standards Institution. With the help of their members they can work out preferred sizes for metric components, fasteners and materials. They can collaborate with their counterparts in other countries in the preparation of international standards. Trade associations also have an essential role in giving early notice of where legislative or other changes in government policies may be necessary to assist progress. We shall therefore be relying greatly on the work of trade associations in all our tasks.

Organisation of Staff

3.16 To fulfil our responsibilities we need an effective staff organisation. Figure 1 shows in chart form the organisation which we have developed. Under the Director, the staff is divided into six Divisions. The Economic Sectors Division is responsible for relations with the main industrial, commercial and agricultural sectors of the economy and provides the secretariat for the six Steering Committees concerned with those sectors. The Technical Division is e general service unit, providing advice on the technical problems to which the change to metric units gives rise. The Education and Industrial Training Division is responsible for keeping an overall watch on the educational and industrial training aspects of the whole of our work and provides the secretariat for the Steering Committee for Education and Industrial Training. The Planning Unit which is only now being built up will work closely with the Economic Sectors Division and the Education and Industrial Training Division. These Divisions will provide the detailed information available about the metrication programmes in industrial sectors of the economy. This information, which is very diverse, will be organised into a presentational form which will bring out the inter-relationship and interaction of the industrial, commercial, educational and legislative programmes. The Unit will be responsible for providing continuing surveys of the developing situation, demonstrating both the national position and the situation within the particular sectors. The Information Division is responsible for the execution of all aspects of our information policy. The Division provides the secretariat for the Information Policy Committee. The Secretary and Head of Administration is in charge of the sixth Division, which is responsible for arranging our business, for managing the staff of the office, for day-to-day control of financial affairs and for all general policy matters not confined to any specific sector or group covered by other Divisions. This Division is also responsible for liaison with central and local government, for the legal aspects of metrication and for such international aspects as are of concern to us.

Staff Numbers

3.17 When the offices opened in April, 1969, there was a total staff of eight. By the end of the year the total staff was 44. The planned staff for the end of 1970 is 67.

The Cost of the Board

3.18 The total cost of the Board during nine months ending on 31st December, 1969, was approximately £161,000. Details are shown in Appendix C. We expect our expenditure in 1970 to be approximately £700,000. A large part of the increase will be caused by an expanded information programme.

4: Education

Education in all its varied forms has an essential role in the successful change in our society from the use of imperial units to a like familiarity with metric units. The school education service will provide the continuing impetus to the change by producing an increasing flow of young people leaving school or higher education, thoroughly grounded in metric measurement and ready to take their places in adult life. A major task falls on the further education service, in the re-education and re-training of those who are already at work. We are counting on the educational services to make our job easier. The children now going into the primary schools will from the start be learning to think metric. Those already in higher educational establishments and those retraining will be breaking the habits of thinking imperial. 4.1

A review of the way in which the education service is meeting the nation's needs falls conveniently into the areas represented by schools, further education and the less formal fields in which voluntary services of many patterns play a part. 4.2

Schools Council

In England and Wales responsibility for the school curriculum rests largely with teachers and, particularly, with head teachers. There would be little support for any major departure from this tradition. There is, of course, a recognised need for some guidance in curriculum study and development. This found expression some seven years ago in the Curriculum Study Group in the Department of Education and Science which was subsequently transferred and absorbed into the Schools Council, established in October, 1964. The central responsibility of the Schools Council is for curricula and examinations. It follows that metrication is a factor of major importance to its work and it has so far published two guides for teachers—*Change for a Pound* (which also covers decimalisation of the currency) and *Measure for Measure* a guide to metrication for workshop crafts and technical studies. The Council is already closely connected with the work of the Steering Committee for Education and Industrial Training. Our co-operation with the Council was demonstrated when *Dialogue,* the Council's newsletter, carried to all schools in England and Wales an article by the Board Chairman, which was accompanied by a pamphlet, prepared by the Steering Committee, setting out in simple and direct terms what metrication means in the schools. This work with the schools has been greatly helped by publications from the Royal Society, one for Primary and one for Secondary Schools. The Consultative Committee on the Curriculum in Scotland has also published advice to teachers on the implications for school curricula of the change to metric units. 4.3

Costs of Educational Changes

Since teachers have the main responsibility for implementing the change within the schools and of enlisting the support of their local communities for the transfer to the metric system, their active support is indispensable. At a time when expanding knowledge makes great demands on the time of all pupils, teachers will surely seize the opportunity to adopt the metric system. It offers such a substantial saving of time. It will no longer be 4.4

necessary to spend valuable hours on the intricacies of the imperial system of measures. Some additional cost will inevitably fall on the schools; in our view, however, the benefits will fully justify the expenditure involved. Teachers traditionally show great ingenuity in improvisation and this is to be hoped for and encouraged. Nevertheless, teachers will properly look to the local education authorities and to the Education Departments for adequate funds to meet the inescapable expenditure in schools to which metrication will give rise. It is government policy that the cost of metrication should lie where it falls, and this policy is no less applicable to central and local government responsibilities.

4.5 Children now in Primary Schools will not complete their education until after the change to the metric system has been achieved. It is essential, therefore, that they should be trained at once to use and to think in SI units. It is not practicable to drop all instruction in the imperial system, but such instruction should be in the nature of a second language, rather than in the "mother tongue". Children already in Secondary Schools will be familiar with the basic elements of the imperial system, so that there should be no serious transition problem when they move out into a world which will still be partly imperial and partly metric.

Examinations

4.6 In England and Wales the examining bodies exert an important influence on the curricula. The Schools Council co-ordinates the work of the eight Examining Boards for the General Certificate of Education and the fourteen Boards for the Certificate of Secondary Education. It has already looked into the practicability of a more unified approach to the introduction of SI units into examinations, without impairing the independence of the Examining Boards. There will be confusion and frustration if, in the same school, different time-tables of change are adopted for the examinations of different Boards, and for different subjects under the same Board. The overwhelming need is for an agreed timetable of change for all examinations. This is the situation which prevails in Scotland where the single Examination Board has already proposed that all relevant questions on the ordinary grade should be set exclusively in SI units in and after 1972 and on the higher grade in and after 1973.

Availability of Text Books

4.7 Given a clear lead on the date of change, the publishers and the manufacturers of educational apparatus are not likely to be unwilling or unable to cope with the demand for books and materials. Many are already well ahead in the production of texts and apparatus and there is a steady flow of new text books in SI terms. The Education and Training Steering Committee is keeping in touch with the publishers to give all possible information about the changes in curricula and, as part of a broader background, about the industrial programmes for making the change.

Further Education

4.8 This covers a very wide range of education from work at school level to post-graduate work. Where the education is vocational, curricula are closely directed towards the needs of the industry concerned. The pace of the change to metric units in vocational courses is being related to the metrication plans of particular industries.

Technical Examinations

4.9 The City and Guilds of London Institute and the Regional Examining Bodies are essentially concarned in devising courses and examinations appropriate to individual industries and have been very active within the metrication field. They have been fully seized of the need for early decisions. The Council of Technical Examining Bodies has already published joint proposals for examination changes for the construction, engineering, mining, paper and printing, and the shipbuilding industries. The Joint Committees for National Certificates and Diplomas are also keeping in close touch with the proposals of their industries and are putting forward corresponding changes in their examination procedures.

The three bodies concerned with the syllabuses and examinations in the further education field in Scotland are the Scottish Council for Commercial, Administrative and Professional Education, the Scottish Association for National Certificates and Diplomas and the City and Guilds of London Institute. In conjunction with college staffs and after consultation with industry, these bodies have arranged timetables for change in courses and for the introduction of SI units into examinations. 4.10

Training Teachers

Colleges and Departments of Education have a clear duty to anticipate the demands which will be made on teachers. Their students now in training should already have been prepared for the transfer to the metric system and be thoroughly familiar with those SI units which will have immediate application when they take up their first teaching appointments. 4.11

Most, if not all, University faculties concerned with the teaching of science or mathematics are already fully committed to the use of SI units. Many students of architecture and medical science are among those from other faculties who are currently educated wholly in metric terms. The professional institutions, too, recognise the high priority which must be given to the change. No problems seem likely to arise from the change to metric units within the sphere of the Universities or at the levels of higher scientific and technical education. 4.12

Outside schools, colleges and formal institutions, there is the general need to inform and educate the public, through the education services of voluntary bodies and through television and radio educational programmes. Effective contact has been established with these agencies which in their educational activities are directly or indirectly dealing with the changeover to SI units. The Further Education Advisory Committee of the British Broadcasting Corporation and the Schools Broadcasting Council are well aware of the position through membership of the Steering Committee for Education and Industrial Training. Extra-mural Boards are less obviously involved, but they have some role to play and their co-operation will be sought. The Adult Education Association is actively engaged in furthering knowledge about metrication. 4.13

Generally there is cause for encouragement in the education situation regarding metrication. At all levels, a lively start has been made, and the principal function of the Board from now on must be to see that the education service is kept fully informed of developments so that it can keep pace with, and indeed anticipate where it can, the national rate of change in industry. 4.14

5: Transport and communications

The transport and communications industries impinge upon the lives of the entire population. They form some part of almost all forms of economic activity and of many other activities, social, cultural and recreational. It follows that decisions to change to metric taken in this sphere will have a widespread impact on the community. 5.1

In this chapter we are concerned only with the operational aspect of the transport and communications industries, that is the movement of people and goods, and the communication of oral and visual messages and signals. The other problems are broadly similar to those of the construction and engineering industries, namely, the provision and maintenance of the infrastructure required for the operations (roads, docks, airports, telephone exchanges) and the manufacture of the "tools" of the operations (land, water and air vehicles and telecommunications equipment). These aspects are considered elsewhere in this report. 5.2

Transport Operators

We deal first with transport operations. A sizeable proportion of these is in public hands, notably the British Railways Board, the British Waterways Board, the British Transport Docks Board, the National Freight Corporation (road haulage), the Air Corporations (British European Airways and British Overseas Airways Corporation), and the Post Office (parcels and mails). Shipping however is largely a privately-owned industry as is much of road transport. 5.3

Role of Public Authorities

It is hardly to be expected that within these different and often traditionally competitive interests a national co-ordinated plan or programme for metrication would evolve naturally. On the other hand, virtually all transport operations, whether public or private, are subject to a substantial degree of control and regulation by Government and other public authorities, mainly, though not solely, in the interests of safety. It follows that a change as far-reaching as metrication can be brought about smoothly and efficiently only if it is positively facilitated, fostered and encouraged by the authorities responsible for this control and regulation. In many cases this will involve detailed legislative changes. 5.4

Freight

The purpose of all transport operations, whether by land, water or air, is to move persons, livestock or goods. Metrication in relation to the movement of people may involve adjustments in fare structures, though at no time in the past or the foreseeable future would tariffs depend on the size and weight of human beings and the only change will be in the unit for measuring distances. On the other hand, metrication is of great importance for the carriage of goods and notably for that part of freight transport, the major part, which is carried on for "hire and reward" since virtually all commercial and industrial activities involve movement of goods at some stage. We do not need to concern ourselves with those manufacturers and traders who carry their own products in their own vehicles. Their need to change to metric measurements will arise primarily out of their activities as consignors and distributors rather than as carriers. All other goods carriers, however—and these include the Post Office 5.5

parcels service—will have to metricate their tariffs and other charges which almost invariably depend on weight, dimensions and distance. The way in which and time at which this is done will be of concern to the whole community.

Co-ordination Arrangements

5.6 We consider that the interests of trade and industry generally would best be served if all "hire and reward" carriers of freight were to agree on a common date for the metrication of their tariffs. Since there is no trade association or comparable body which could bring together the various forms of transport for this purpose, we took the initiative and arranged a meeting at which were represented all classes of operator, the main bodies of user and the Government Departments and other bodies principally concerned. General agreement was reached that all concerned must co-operate in planning and implementing metrication. The meeting decided to establish two representative working parties, one for inland freight transport and the other for overseas freight transport. The Confederation of British Industry is assisting by providing liaison and co-ordination between these two working parties which will draw up detailed plans for metrication taking the fullest possible account of the views and needs of consignors. A likely date for metrication of freight tariffs is 1st January, 1972, though no final decision has yet been taken in favour of this particular date. There would be advantage if metric units were introduced at the same time for the purposes of the Customs and Excise Tariff and of United Kingdom trade statistics. In some cases the introduction of metric units would require legislation and the date of changeover must therefore allow time for this. The timetable must also provide for the conversion or replacement of weighing machines used by carriers. Although there may be some problems about the sizes of freight containers, these will arise, if they do so, out of efforts to achieve international standardisation, not out of the change to the metric system in the United Kingdom.

Road Speed Limits

5.7 One of the more widely-felt effects of metrication of road transport will be the changes in speed limits to kilometres per hour. The Ministry of Transport has already announced its intention to make these changes in 1973. The new limits will not be conversions of those existing (since precise equivalence, even with rounding to the nearest kilometre, would produce inconvenient figures, difficult to remember, observe and enforce) but the nearest practicable figures. The current Regulation regarding speedometers makes no reference to units but merely stipulates that a vehicle shall be equipped with a device to indicate the speed at which it is travelling. The Ministry and the manufacturers are considering the practical problems that will be involved in the continuing use of existing imperial speedometers.

Road Signs

5.8 A major task will be that of changing or replacing some 250 thousand existing road signs showing statutory speed limits. This will closely involve local authorities and the Ministry is already giving thought, in consultation with them, to the practical problems that will have to be resolved to carry out the operation in the shortest possible time.

5.9 It would of course be convenient if the many thousands of other road signs—those showing distances and height, load and width limits—could be converted at the same time. But for practical reasons the Ministry expects to have to concentrate on the speed limit signs, leaving the conversion of others to be spread over a longer period. It is our view that it would be undesirable during the period of transition to show distances in both miles and kilometres on the same road sign.

Goods Vehicles

5.10 All goods vehicles are subject to statutory control and since 1st October, 1968, heavy goods vehicles have been subject to the Ministry of

Transport's testing scheme. This provides for the fixing to the vehicle of an official plate showing the approved gross and axle weight in both imperial and metric. For practical reasons the testing process has to be staggered. Priority is being given to pre-1968 vehicles; these should be completed by April, 1970; 1968 and 1969 vehicles will be completed by April, 1971; and later vehicles a year after they come into use. As an interim measure, since 1st January, 1968, new vehicles have had to be fitted with a manufacturer's plate which is, however, in imperial only. It seems inevitable that there will be a period during which some heavy goods vehicles will not have their permitted weights shown in metric. Whilst it might not be essential, it would be desirable for metric permitted weights to be known and shown by the time the freight industry as a whole goes metric, which, as indicated above, may be 1st January, 1972. We have asked the Ministry to take steps to ensure that the manufacturers' plates should include metric equivalents.

For excise purposes, goods vehicles are classified according to unladen weight. The Ministry of Transport recognise that it will have to convert the definitions of each class into sensible metric terms for inclusion in a Finance Bill. 5.11

Railway Operations

The effect of metrication on railway operations is fairly restricted. It affects freight charges and, indirectly, timetables. British Rail is co-operating in the freight study already mentioned. Meanwhile it is using its own conversion tables to quote rates for metric consignments where required. Published timetables will require change only in so far as distances are included in them. The actual running of trains is a complex process highly regulated in terms of speed, distance, weights and pressures, all of which dimensions feature in operations instructions. The task of metricating these will be a considerable one for British Rail and will be accompanied by a staff training programme; but that is a domestic matter which will have no impact outside the railways. 5.12

Shipping and Navigation

Metrication in shipping and navigation is primarily a matter of changing various Acts, Regulations and Rules relating to design, safety and classification. The knot and the nautical mile are internationally recognised units which will continue in use. Lloyds' Rules are already in metric terms. The Board of Trade has under consideration the changes which will be necessary in the Merchant Shipping Acts, Regulations and Rules. The Hydrographic Department of the Ministry of Defence is now doing its surveys in metric and as charts are reprinted they will be redrawn to show metric measurements. Revised charts for British waters are expected to be available during 1972. From the beginning of 1972 "Admiralty" tide tables will be issued in metric and the Ministry of Transport will convert its tide gauges accordingly. Although the matter goes wider than shipping and harbours, it may be convenient to mention here that the conversion to metric terms of Regulations covering certain specialised transport fields such as the carriage of dangerous goods (radioactive materials, explosives, etc.) has been put in hand by the Departments concerned. 5.13

The shipping industry will need to respond to these changes, notably in the retraining of its staff and crews, ashore and afloat. They will need to become familiar with the use of metric terms and instruments not only for navigational purposes but also on the management side, victualling, re-fuelling, loading and documentation. Following discussions with the Association of Marine Engineering Schools and the Association of Nautical Schools about examination syllabuses, papers for masters and mates will be in both units from September, 1970 and wholly metric from September, 1971; the examinations for engineers will be in both units from September, 1970 and wholly metric from December, 1970. 5.14

Harbours and Docks

Much of the capital equipment in harbours and docks is long-lasting. There should be no problem over the conversion of published data into metric dimensions, such as widths of entrances and locks, heights and clearances of bridges and weight limits and radii of cranes. Dock and harbour authorities have taken part in the freight discussions referred to above and have expressed their readiness to metricate their operations, including dues, to the extent necessary. 5.15

Civil Aviation

Airlines already use metric weights for the handling of freight and baggage. They will welcome the conversion to metric of customs and other documentation. There is unlikely to be any early change however in air navigational practice, particularly in the units to be used for the purpose of air to ground communication in the course of flying operations and for the calibration of instruments. The International Civil Aviation Organisation has been discussing metrication ever since its foundation in 1947. At present two sets of international standards are in force, one in 43 countries and the other in 79 including the United Kingdom. Both sets of standards use the knot and the nautical mile. The difference between them is in the units used for vertical measurement of distance and speed. In one set these dimensions are in metres and metres per second and in the other they are in feet and feet per minute. 5.16

The users of the second set of standards (known as the Blue Table) include, as well as the United Kingdom, the United States, which is the largest manufacturer and user of aircraft. The International Civil Aviation Organisation has established a panel of experts to examine the whole question of vertical measurements and may consider among other possibilities the formulation of entirely new units for these purposes. This investigation will take some time. The Board of Trade has stressed the inherent danger, if metrication were extended to this field of a transitional period whilst air-crews and control staff were being re-educated in the new system since decisions at critical moments of flight have to be taken instantaneously and do not allow reference to ,conversion tables. While it would be consistent with the objective of general metrication for aviation in the United Kingdom to change from the Blue Table to the metric standards, we consider that this is an issue which must be left to be decided in the light of the discussions in the International Civil Aviation Organisation. 5.17

Communications

The operations of the communications industry are dominated by the Post Office, a public corporation. Metrication will have a noticeable effect on the provision and maintenanca of communications equipment. Its effect on day-to-day operations other than maintenance will be limited. Trunk telephone calls are charged partly according to distance and there should be no difficulty in basing these charges on kilometres instead of miles. In broadcasting metric measurement of wavelengths has been used from the outset and the public is familiar with it. The Post Office, as parcels carriers, is participating in the freight discussions referred to above. The measures taken to metricate the parcels service will of course be relevant to plans which the Post Office is evolving for the metrication of the rest of the mail service. 5.18

6: Fuel and power

The fuel and power industries and the petroleum industry constitute a major sector of the national economy. As substantial buyers of engineering equipment, plant and materials from all branches of industry and as suppliers of materials, manufactured products and fuels to industry, commerce and domestic consumers, they can have a strong influence on the change to metric throughout the economy. Early standardisation of the power and energy units to be used for all fuels is of major importance for industrial and domestic users. Users should be able to make an easy and straight-forward comparison between the several choices of fuel and fuel burning appliances available to them. 6.1

The intensive use of long life capital equipment and plant in the fuel and power industries gives rise to a continuing difficulty: the industries will need to maintain adequate stocks of spares and tools to service imperial equipment for varying periods. The metric replacement or conversion of plant and equipment has already begun but it will take many years to complete. It will depend to some extent upon metric progress in the plant manufacturing industry and on the availability of metric standards. 6.2

Electricity

In the electricity supply industry, sale of power by the kilowatt and energy by the kilowatt hour is internationally established and the kilowatt is likely to be retained as an international unit for electrical power. The electrical industry has been well to the fore in considering the effect of metrication in its own installations and in 1966 the Central Electricity Generating Board published its programme for the change. From 1st January, 1969, all contracts for new projects have been expressed in SI units with the imperial equivalent in brackets. A comprehensive metric manual has been published and training programmes organised in conjunction with the Electricity Supply Industry Training Board. The first metric power station should be in operation by 1975, though not all elements of the construction will be metric. The Scottish Electricity Boards keep in close contact with the Central Electricity Generating Board and are following a similar programme. 6.3

Gas

Planning by the gas industry is greatly simplified by the existence of one organisation embracing virtually the whole industry. The extraction of natural gas is already licenced in areas expressed in square kilometres, and the size of the safety zone established around fixed platforms off-shore is expressed as a circle having a radius of 500 metres. The Gas Council has a standards committee which is the co-ordinating body for all aspects of the change to metric units in the gas industry. This committee collaborates with the metric panel of the Gas Industry Standards Committee of the British Standards Institution (which includes representatives of the Gas Council, the Institution of Gas Engineers, the Society of British Gas Industries and the Ministry of Technology). In general no outstanding technical difficulty is foreseen. 6.4

Units of Sale

The gas industry, unlike electricity, is inevitably faced with a change to a metric unit of sale. The present calorific value of gas is defined in the Gas 6.5

Act, 1948, in terms of British Thermal Units per cubic foot. A change of standard will require amending legislation. The industry would like to use a "metric therm" of one hundred megajoules as the unit for sales. We hope that the industry will be persuaded to adopt the kilowatt for power and the kilowatt hour for energy.

The industry will be faced with the task of the conversion or replacement of gas meters to record consumption in the new units of sale. The industry proposes to embark on this change as soon as its decimalisation programme has been completed. It envisages that for a period which may be as long as 15 years both metric and non-metric reading meters will be in use. During this time, those still having old meters who might wish to assess their consumption would be issued with conversion charts. 6.6

Petroleum

The Metrication Co-ordination Committee of the Institute of Petroleum has published a *Programme for the Change to the Metric System in the UK Petroleum Industry*. This recommends an overall timetable and programmes for sales, finance and administration, transportation, and refinery and bulk plant operations, designed to see the completion of the changeover by the end of 1975. 6.7

Units of Sale

The change to metric units in the oil industry will affect all stages of production, refining and marketing. At the oilwell, production has traditionally and universally been recorded in measures of the United States barrel (20 thousand barrels per day equals an annual production of one million long tons) and international agreement would be required to change this. Industrial users of oil have an interest in the timing of the oil industry's programme and will wish for a reasonable linking of the timing of the change in the units of sale of oil with that of their other materials. At the retail end, many thousands of individual fuel pumps will have to be converted to enable petroleum and liquid oil products to be sold by the litre. This is considered in more detail in Chapter 16. The Customs and Excise Department will require legislative changes to permit the use of metric units as the basis of revenue duties. 6.8

Coal

The National Coal Board has as yet no overall programme for metrication of the industry, but has established a number of working groups to study specific aspects. The National Coal Board is following the programmes of the other industries with which it is associated as a supplier and customer. Meantime changes within the industry are being introduced on a piecemeal basis. A metric policy statement for equipment suppliers has been issued and is now in operation. The National Coal Board is accepting only metric designs whenever equipment is redesigned and a growing number of items are already purchased only in metric measure. 6.9

Units of Sale

Bulk sales of coal will almost certainly be made by the metric tonne. Smaller quantities are likely to be marketed in multiples of five kilogrammes. Fuel sizes will also be subject to change. When coal production switches to metric fuel sizes, use of the metric description will be obligatory throughout the industry and the distributive trade. The timing of the changeover will be influenced by the commercial requirements of the major customers and will depend on when weighing and screening equipment can be converted. 6.10

The National Coal Board shares with other public utilities the problems of maintaining long-life plant. Much modernisation and standardisation has taken place in the industry over the past years and the instant availability of maintenance spares for highly productive underground and other equipment is imperative. The conversion of weigh-bridges owned by the Board will be a large undertaking. 6.11

Safety in Mines

6.12 The Ministry of Technology is concerned with the effect of metric conversions on the administration of the Mines and Quarries Act and the Nuclear Installation Act, 1965. The Act provides for much subordinate legislation by the Minister in three categories: regulations applying to mines or quarries throughout the country; regulations applying to individual mines or quarries; and miscellaneous quasi legislation, for example, in the forms of approvals and consents. These regulations are under continuous review, during the course of which metric terms are being introduced. Revision is necessarily protracted. In this field, safety is the over-riding consideration and it is necessary to take into account the views of the National Coal Board and other mining and quarrying interests, including the mine and quarry workers. Revision must in some cases await the availability of new metric equipment which satisfies the required safety standards.

7: Land, surveys and maps

Surveys

Metrication is having an important impact on land surveying, mapping and development planning and thus on property and estate management. All this is very relevant to the changes in agriculture and construction. 7.1
A welcome lead has been given by the Chartered Land Societies Committee, a joint Committee of representatives of the Royal Institution of Chartered Surveyors, the Chartered Land Agents Society and the Chartered Auctioneers and Estate Agents Institute. It has recommended members of these professions to change to metric measurements in their documents and negotiations at the same time as introducing decimal currency. It suggests a practice period starting from February, 1970, during which all measurements and values will be duplicated in the new and old systems. After February, 1971, imperial units will progressively be dropped.

Assessments

The Valuation Office of the Inland Revenue decided in 1968 that metric measurements would be used in arriving at the assessments for the 1973 rating revaluation. Its programme for changing the necessary records is well under way throughout its district offices. 7.2

Land Planning

Metrication has been taken into account by Government Departments in their review of land planning legislation and related advice. Important aspects from the point of view of landowners, developers and professional practice are changes in the requirements of local authorities for developers. These requirements are normally based on advice and model codes of practice issued by the appropriate Government Departments. The Ministry of Housing and Local Government foresees no difficulties in the acceptance by local authorities of metric plans. The local authorities themselves are ready to make the change. 7.3

The Ordnance Survey

Since November, 1969, the Ordnance Survey has switched its programme of surveying for the 1:2500 and 1:1250 series of maps to a metric basis. All new maps in these series will be published with metric details. The complete cycle for the production of a new series of maps is necessarily a long one. The present survey on these two scales had been under way for over 20 years before the decision was made to change to metric and it will take a further 10 years to complete the coverage of the whole country. During that time some maps, based on the new survey but issued before the decision to change to metric, will be revised and re-issued and the opportunity will then be taken to change to metric all the present imperial measurements. Towards the end of the 70s, as more resources become available with the completion of the large scale survey, it will be possible to undertake the revision of those large scale series maps which were published before November, 1969, and which have not subsequently been revised. This may take a further two years, bringing to 1982 the total coverage of the country by large scale metric maps. 7.4

Popular Map Series

The Ordnance Survey has not yet finalised plans for the smaller scale maps. For the popular inch-mile series and many of those based on it a change of scale will be necessary. At present a scale of 1:50000 has much 7.5

to commend it as a replacement for the 1:63360 (inch-mile) scale. If public demand establishes a need for a country-wide coverage on this scale by 1975, this could be done by photographic enlargement of existing maps. Ordnance Survey is actively discussing long-term alterations in scale, presentation and format with organisations representing the major map users.

7.6 We are satisfied that the Ordnance Survey proposals are well considered and represent a prudent use of their cartographical resources. Some inconvenience may be caused to map users by the time-span of the programme, but there are no insurmountable obstacles caused by it and any inconvenience must be weighed against the cost and practicability of changing it. Land users see no difficulties and arrangements exist for meeting special needs, such as those of planning authorities.

8: Agriculture and horticulture

Agriculture and horticulture are predominantly industries of many small businesses. There are some 350 thousand holdings in the United Kingdom of which some 190 thousand are large enough to keep one or more people fully employed. The smaller farms predominate in the northern and western parts of England, in Wales, and in the hill and upland regions of Scotland and in Northern Ireland. The industries have a total working population of just over 700 thousand, approximately 3% of the United Kingdom labour force, of which about 380 thousand are employers. The gross product is around £1,000 million, about 3% of gross domestic product. 8.1

Little Re-equipment

Agriculture and horticulture are similar to other industries which are the source of primary products, in that the impact of metrication will not involve great changes, contrasting with some sectors of manufacturing industry. The product will not change. Much of the equipment will not need to be replaced or altered. Usually it will be necessary only to renew some measuring instruments and to re-calibrate weighing machines and dipsticks. Metrication will, however, vitally affect the planning of agricultural and horticultural enterprises and the financial assessment of the results of the resources employed. There will be substantial changes too in the units to be used in the supplying industries, in marketing, and in Government regulations and requirements. 8.2

There are no dramatic advantages to be gained by agriculture and horticulture from metrication. The main ones will be those of simplification of accounting, and of the calculation of inputs and outputs and the performance of particular enterprises. There may also be some marginal technical improvements to be made along with the adoption of metric units. For example, the farming industry is taking the opportunity offered by metrication to consider whether there are advantages in selling milk off the farm by weight instead of volume. Containers for farm produce such as vegetables and fruit can perhaps be standardised to a greater extent than at present as part of the general improvement in marketing which is proceeding. 8.3

Farm Buildings

The construction industry's programme and its campaign for a greater measure of dimensional co-ordination is having its effect on the design of farm buildings. The Ministry of Agriculture's Agricultural Land Service is in close touch with the construction programme and some time ago appointed officers to deal with metrication in each Region. The Service continues to be represented on the British Standards Institution Farm Buildings Committee. Under its lead the Ministry has staged metric exhibits at a number of Agricultural Shows over the past three years which have aroused considerable interest. There is a permanent metric exhibit at the Farm Buildings Centre at the Royal Show Ground at Stoneleigh, Warwickshire. The Country Landowners' Association has been closely connected with work on the metrication programme for farm buildings, in collaboration with the British Standards Institution and the Ministry of 8.4

Agriculture's Agricultural Land Service. The Association's Technical Working Party on Metrication is continuing to deal with questions affecting farm land and buildings.

National Farmers' Union Metrication Committee

8.5 The National Farmers' Union has a metrication committee which is the main planning body for the agricultural and horticultural sector. This committee is representative of all United Kingdom agricultural interests and is in close touch with work being done in related industries. It is well aware that, compared with some sectors, farming has started late in planning and is now subject to considerable pressure from the educational and industrial sectors which are emphasising the need for a timetable to be made known so that they can complete their own planning. For example, the industries manufacturing two of the farmer's and grower's main supplies, fertilisers and other agricultural chemicals, are adhering to their own industry programmes so far as transactions between firms within the chemical industry are concerned. However, they have agreed that, as far as possible, they will make the required changes in their packaging and marketing arrangements fit in with the farming timetable.

The Agricultural Departments' Role

8.6 The Agricultural Departments have a very large part to play in the change-over. They are revising their advisory literature and standard technical works, introducing metric units. The agricultural advisory services—in Scotland the advisory service is provided by the three Agricultural Colleges—have set up metrication groups to consider the effect of the change on their various scientific disciplines and to arrange for their own internal retraining. These services are in daily contact with farmers and horticulturists. They will have a vital part to play in introducing the new measurements to the industry and in making them a familiar part of everyday life and work.

8.7 The agricultural industry is closely supported by Government with the system of deficiency payments and production and investment grants and this requires a detailed flow of information about the industry. The farmer or his merchant is required to complete many application forms and to render periodical statistical returns. The amendment of the regulations governing these will be indispensable to the change to metric measurement in farming. We are glad to be assured that the Departments are currently reviewing all their procedures and that they hope to announce shortly their views on a practicable target date for making the required changes.

Standards and Units

8.8 Many British Standards have been established for products which are used by industries in the sector and these are being steadily amended. Very few standards, however, are concerned with actual processes and products of the farming industry itself and none of these is likely to prove critical to the progress of metrication. Particularly important to horticulture are those standards dealing with the packing of fruit, flowers and vegetables. Many of these standards should be available in metric form during the next twelve months. Unlike other farm products, these are not the concern of any statutory marketing or development authority and the change will require concentrated effort by organisations representing both growing and marketing interests. We see no reason, however, why such an effort should not bring early results.

8.9 We have been asked to give our views on two of the SI units to be used in this sector. It was put to us that the hectare is too large a unit for measuring land areas for farming purposes, particularly on small farms and on horticultural holdings. We feel, however, that it is not necessary to introduce other multiples when smaller areas can be expressed in square metres or as sub-multiples of a hectare. We have, therefore, suggested that the units of land area measurement should be the square metre, the hectare and the square kilometre. Secondly, we support the view that the

kilogramme and the tonne are adequate units of weight for all agricultural purposes and there is no need to introduce an intermediate unit of weight, such as the quintal.

Co-ordination with Distribution

8.10 The Board sees the need for co-ordination of metrication programmes throughout the chain of food production, marketing, distribution and retailing. It is obviously not possible, however, to change everything within the whole of this complex network at one time. The work of converting weighing machines alone may well spread over a considerable period. There will be points within the distribution system where for a considerable time both imperial and metric units will continue in use. We do not find this a reason why any delay in changing the wholesale or retail sector should necessarily hold up metrication on the farm.

Target Date, 1972-73

8.11 The first priority, however, is the establishment of a timetable for the change in agriculture and horticulture. Some of the work for this is already in train within the organisation of the National Farmers' Union. We cannot at this stage foresee all the obstacles which may arise in the course of working out the metrication arrangements for agriculture and horticulture. Nevertheless, if all associated legislation and administrative procedures can be adapted or amended in good time, we see no reason why a target of 1972-73 should not be used for planning purposes. It must be accepted that as detailed plans are developed it may not prove possible to implement all the necessary changes within this two-year span and some may extend through 1974. It is, however, very desirable to secure agreement on a target date so that related activities can fall into place. There will be considerable work arising from these activities even after timetables have been published and widely read. Generally the Agricultural Departments and their associated services, the farmers' organisations and the marketing organisations are well equipped to carry through the necessary changes.

9: Fisheries

There are about 18 thousand fishermen employed and five thousand partially employed in the United Kingdom fishing industry. The total value of the catch landed in 1968 was over £62 million. The inshore sector of the industry, which is more important in Scotland and Northern Ireland than in England and Wales, is made up of small businesses consisting normally of a vessel owner and a small crew. The deep sea sector has a few large businesses but it too consists mainly of small or family run companies. 9.1

International Metric Regulations

The fishing industry is already subject to international regulations which define such items as sizes of net mesh in metric terms. The metrication programme in the shipbuilding industry will affect the construction of fishing vessels. As time goes on other items used in the fishing industry will be made to metric designs. 9.2

Marketing Changes

The White Fish Authority and the Herring Industry Board have the statutory task of reorganising, regulating and developing the industry. They have set up an informal working party on metrication and standardisation to formulate proposals. The working party consists of a number of individuals with expert knowledge in one or other sector of the industry. 9.3

Over the past few years there have been many developments in fishing techniques and handling of the catch. There remains a considerable need to standardise the handling and methods of sale of fish at ports. The working party is therefore concentrating on the buying and selling of fish including the various types of containers in which fish is handled and carried to the market. 9.4

Links with Retailing Changes

In its first report the working party concluded that the timing of the change in the fisheries industry would be dictated by the retail situation. It felt that there was a need to co-ordinate the change in fish retailing with that in other food retailing, such as butchers and greengrocers, so that acceptance of metric trading by shoppers would be well established when the fish trade made the change. We see the need for a measure of co-ordination of metrication programmes throughout the chain of food production, marketing, distribution and retailing. But, as explained elsewhere in this report, the change throughout the distribution complex is likely to take place by stages. Inevitably during this transition period there will be part of the consumer market within the distribution network where trade is conducted in metric units while other trades continue to use imperial units. Retailers will have to cope for many years with customers who persist in ordering in the old imperial quantities, even after their whole trading operation has been transferred to metric units. It is not therefore practicable to think in terms of a single M Day and the fisheries industry, like other sectors, will need to decide when its trading interests will best be served by changing over to metric units. 9.5

There seems no inherent reason why the fisheries industry should not make this change as soon as metrication fits into its plans for improvements 9.6

in its marketing arrangements. We recognise that the main difficulty in metrication in fishing will come because this industry, consisting of a large number of very small units, has many old-established and localised traditions which will not readily be given up. The fishing industry is in receipt of government subsidies, both grants and loans for vessels, and payments based on actual fishing operations where metrication presents no serious problems. The fishing authorities, striving to improve the efficiency of the marketing arrangements of the industry, should be able to co-ordinate and to accelerate the series of necessary changes of which metrication will be but a part.

10: Forestry

The annual value of forest products in the United Kingdom assessed "at the roadside", is about £20·5 million (the value for Great Britain is about £20·0 million) and the total labour force employed is about 18 thousand. In Great Britain roughly half of the forestry industry is managed by the Forestry Commission while in Northern Ireland a similar role is played by the Ministry of Agriculture (Northern Ireland). The remainder of the industry is managed by private woodland owners. 10.1

Forestry Commission Plan

The Commission has prepared a comprehensive plan for metrication in forestry. Much of the impetus to the initial planning came from a strong desire to rationalise methods of measurement. A Metric Guide for Forestry was published in April, 1969, after full agreement with the Home Grown Timber Advisory Committee. In addition to presenting the Commission's domestic programme for the change this Guide provides a basis for detailed planning by individual sections of the forestry industry. The timetable given in the Guide envisages the completion of the change to metric working by the end of 1972; however, the main period of the change will coincide with the introduction of decimal currency. 10.2

Home Grown Timber and Imports

The Council for the Home Timber Merchants' Association of England and Wales has recommended the changeover date of 1st October, 1970. This objective has been fixed as being acceptable to the timber growers and to the consumers, taking account of the decision of the imported timber trade to begin trading in metric on 1st April, 1970. 10.3

Metrication provides an opportunity for introducing logical and international measurement standards for the forestry and timber industries, replacing traditional measures, such as the expression of volumes of timber in hoppus measure. Thus the bases of measurement and calculation will be completely changed. Re-equipment will consist almost entirely of replacement of measuring instruments. We have identified no serious obstacles. 10.4

11: Industrial materials

The major industrial materials industries, metals, chemicals, timber, glass, paper and board, provide the necessary basic supplies to virtually every industry in the country. All of these industries have prepared programmes for the change to metric which are planned to be completed by the beginning of 1973. No insuperable obstacles to the change in these industries have been identified. In addition the manufacturers of building materials and components, such as cement and bricks, referred to in Chapter 12, are pressing ahead. The initiative of the materials industries has prompted the consideration of metrication by user industries and the effects of this have been felt right through the economy. 11.1

The effectiveness and timing of these programmes for industrial materials depend to some extent upon the production of metric British Standards, but also upon the timetables of user industries. The construction industry's *Programme for the change to the Metric System* (PD 6030) published by the British Standards Institution in February, 1967, has influenced the timing of the change in those industries which are substantial suppliers to the construction industry. Where the materials, such as metal goods, paints and glass, are extensively used by other industries, such as engineering, agriculture and transport, the programmes and plans for these materials have been related to the timing of changes within those industries. 11.2

Chemicals

A statement of policy for metrication in the chemicals and allied industries was circulated on 28th August, 1969, by the Chemical Industries Association Metrication Committee. This shows that most British Standards for chemical substances are already expressed in metric terms and that packing and invoicing in metric terms is already a well established practice in many sectors of chemical export trade. It remains to phase out the use of imperial units in the home trade as far as possible. The Association recommends that trade between firms in the industry should be conducted in metric terms by 1st January, 1971, and that the change for all trade in chemicals in the United Kingdom should be substantially completed by 1st January, 1973. More specific programmes have been published for paints, dye-stuffs, pesticides, printing inks, photographic materials and synthetic fibres. 11.3

Plastics

The British Plastics Federation Metric Policy Committee has reviewed the metrication position in the industry. The intention is to issue a programme early in 1970. It is expected that the industry's literature will use metric terms by the beginning of 1971 and that the raw material output will be sold in metric measure by the end of 1971. 11.4

Cast Iron

The Council of Ironfoundry Associations is represented on all appropriate committees of the British Standards Institution, including the Iron and Steel Industry Standards Committee. Its members, whose total production is divided almost equally between the engineering and other industries, are ready to meet the requirements of the programmes worked out by the British Standards Institution for the engineering, shipbuilding, construction 11.5

and electrical industries. The British Steel Corporation is studying the timing of the change from long tons to metric tonnes for the supply of pig iron and all steel products.

Steel

The steel industry is co-operating with the British Standards Institution and hence with user interests in the preparation of revised metric British Standards for steel and for the timing of transitional programmes. The programme for the change to co-ordinated metric sizes for steel reinforcing rods and mesh for the construction industry was completed on 1st January, 1970. For steel tubes, international agreement has been reached in regard to both outside diameters and thicknesses. For each size there is both a metric and an inch dimension which, whilst they may not be exact conversions, do in all cases ensure practicable interchangeability. The revision of British Standards is not, in general, expected to involve any change in the physical size of steel pipes and tubes as presently supplied. For hot rolled steel sections, other than angles, international agreement on sizes is still awaited. There is reason to expect that this will soon be achieved. For engineering bars the metric British Standard, including preferred sizes, is published. For sheet steel the British Standard, giving metric thickness, is published but agreement on preferred sizes is awaited. 11.6

The steel industry is already capable of meeting the linear metric requirements of its customers for all its products. Unlike sections, flat products do not in general present any intrinsic problem of supply in metric sizes. It is expected that the changeover to production of co-ordinated metric ranges of sections will take place in the next two or three years. 11.7

The British Steel Corporation has taken steps to publicise the current position on behalf of the industry. It produces a statement on the change-over to the metric system in the steel industry which is periodically revised to reflect current progress. Nevertheless we doubt whether all users and stockholders are adequately informed. Users of small quantities are in difficulty if they cannot be assured of metric sizes from stockholders who generally confine their stocks to preferred ranges. Some engineering designers who need early information on preferrred sizes and the dates from which supplies will be available, have expressed concern that all the required information has not yet been published. The steel industry has stated that the work of preparing metric standards, preferred size ranges (which are prerequisites) and then the transition programmes is proceeding as rapidly as possible in the British Standards Institution and elsewhere. The ubiquitous character of steel use and the large number of interests which have to be taken into account necessarily means a great deal of time-consuming consultations before decisions are reached. For the same reasons it is difficult to ensure that up-to-date information on the developing situation reaches every user. Users therefore are advised to keep in contact with their trade associations, many of which are currently involved in the relevant discussions, or to seek information direct from the British Steel Corporation or British Independent Steel Producers' Association. 11.8

uminium

The Aluminium Federation has recommended a programme for the change which is being followed by the leading aluminium companies. All documents have been in metric terms since 1st January, 1970, and the target date for the completion of conversion to metric production and sales is 1st July, 1970. Materials will be offered to the new metric versions of British Standards already published by the British Standards Institution. Work is well advanced on the metrication of cast aluminium products. 11.9

Copper

The British Non-Ferrous Metals Association recommended its members to 11.10

start working in the metric system from 1st January, 1970, when prices were expressed in £p per 100 kilogrammes instead of £.s.d. per ton. Metric British Standards have been published with the exception of the standard for tubes which will follow international agreement on tube sizes.

Other Non-Ferrous Metals

11.11 In the case of other non-ferrous metals the precise timing of the changeover will be left to individual firms and will depend upon their particular circumstances. In most cases the change will be completed during 1970 and prices will be expressed in £p per kilogramme. No problems have arisen on the production of metric British Standards. It is too soon to say how the many users will respond to the new standards in metric sizes and weights.

Timber

11.12 Metrication in forestry practice is dealt with in Chapter 10. The Timber Trade Federation has recommended that the change to metric measure for imported softwood, hardwood, plywood and sheet materials should take place on 1st April, 1970. The bulk of the timber used in this country is imported and it has therefore been necessary to negotiate with overseas shippers for the supply of metric sizes. In the case of softwood this date therefore coincides with the approximate start of new season's imports although some hardwood, plywood and sheet materials are already available in metric measure. The new basic metric sizes and lengths for sawn softwood have been agreed and published by the British Standards Institution as BS 4471. Nominal metric sizes are, however, so closely approximate to imperial sizes that either will normally serve the same purpose. The main changes are the reduction of size varieties of softwood and the application of conversion factors to stocks held on 1st April, 1970. Owing to the variety of overseas sources of hardwood no standard range of sizes has been agreed. It is expected that thicknesses of hardwood will closely follow those for softwood but there will be variations in respect of widths and lengths. Overseas shippers have been notified of the recommended metric dimensions for plywood and sheet materials and are being asked for their co-operation in effecting the change as smoothly as possible.

Glass

11.13 The Glass Manufacturers' Federation and the Flat Glass Association have recommended that the metrication of flat glass sizes, which began on 1st January, 1969, with the standardisation of glass thicknesses in millimetres, should be completed on 1st October, 1970, when all linear dimensions will be expressed in millimetres and new metric tariffs in decimal currency will come into effect. It is planned to issue the new tariffs quoting prices in £p per square metre in mid-1970 when agreement should have been reached on the supply of new metric stock sizes for flat glass. When decisions have been reached on the preferred sizes for dimensionally co-ordinated windows a corresponding range of co-ordinated metric glass sizes will be needed.

Paper and Board

11.14 In 1967, the British Paper and Board Makers' Association accepted an outline plan for going metric in 1969. This plan called for the adoption of the sizes recommended by the International Standards Organisation and a reduction in the number of stock sizes and weights of all products. The timing of the change has been deferred to meet the wishes of paper consumers. The paper industry has now agreed with the consumer trade federations and associations the dates for the change to the new metric sizes and weights for board, printing and writing papers, printing board, wrapping papers and manilla papers. The change began on 1st January, 1970, with the metrication of wrapping papers, and should be substantially completed with the metrication of board on 15th February, 1971. Office stationery in sizes recommended by the International Standards Organisation is now available.

12: Construction

The Structure of the Industry

12.1 The construction industry can be divided broadly into three groups, design, the manufacture and supply of materials and components, and building and civil engineering works. It is heavily dependent on other sectors of industry for its supplies. Many of these are sold for other industrial purposes, for example, steel, glass, plastics, timber, and the construction industry is not in all cases the main customer. The design group includes the building and civil engineering establishments of Government Departments, local authorities' professional building services and consulting engineers, architects and surveyors in private practice. The building and civil engineering group includes the erection of buildings, construction of highways, airfields and bridges, civil and structural engineering, mechanical and electrical engineering, heating and ventilating installations, demolition and building maintenance. The total value of the output in 196B in the United Kingdom exceeded £4,500 million and involved some B0 thousand firms ranging from general builders to specialists, for example, painting, electrical, scaffolding contractors, employing in excess of one million operatives. Of these firms only some 23 thousand employ more than 7 workers and only 500 have 300 or more. Approximately £1,500 million, or one third of this output, was on building maintenance and repairs. The public sector, including the local authorities and nationalised industries, accounted for over 50% of the total expenditure on construction in all its forms.

Basic Programme

12.2 The construction industry is working to the *Programme for the change to the Metric System* (PD 6030) published in February, 1967, by the British Standards Institution. The National Consultative Council for the Building and Civil Engineering Industries, under the Chairmanship of the Minister of Public Building and Works, set up a Working Party on Metrication in May, 196B, to look into all issues not covered by the activities of the British Standards Institution. In three reports the Working Party drew attention to critical aspects of the change and made constructive proposals to Government Departments and trade associations for their solution and for disseminating guiding information. The programme published by the British Standards Institution includas timetables during the period 1967 to 1972 for the metrication of essential construction industry reference publications, British Standards, components, design and construction. The main four year programme began on 1st January, 1969, when the design of new construction projects in metric began. The change should be completed by 31st December, 1972, when virtually all new construction work should be in metric terms. The production of metric materials and components was scheduled to begin in January, 1970, and should be substantially completed by December, 1972, but the programme allows a further year for manufacturers of components to complete the change-over to full production of metric products.

12.3 The adoption of the metric system by the construction industry is indissolubly linked with the adoption of a series of controlling dimensions in building design. It provides an opportunity for improving the sizes and

designs of building products, at the same time applying dimensional co-ordination wherever technically appropriate. This principle of changing from imperial sizes to a rationalised system of controlled metric sizes is embodied in the programme worked out by the British Standards Institution.

Dimensional Co-ordination

12.4 The concept of dimensional co-ordination is not new in the construction industry. Long before the publication of the programme for the change to metric, the need for greater co-ordination of dimensions and the industrialisation of the building process had been realised, and proposals to achieve this were being developed by responsible bodies in the public and private sectors. The change to metric provides an opportunity to accelerate an advance in building design and technology. This should lead to substantial benefits throughout the construction industry. The practical aims of dimensional co-ordination are to reduce the present wide range of sizes for building components and thus promote more economic mass production techniques; to standardise the sizes of components in order to reduce cutting and assembly costs on site; and to promote interchangeability of components for building designers. It is the development of dimensional co-ordination which, in the long term, should produce the main economic benefits looked for by the construction industry from the change to the metric system.

The Framework of Standards

12.5 The necessary basis for all this change is a series of head standards which the British Standards Institution has agreed with industry. The early adoption of these standards by designers, specifiers and manufacturers is essential for effective metrication in construction. These head standards are:

Basic sizes for building components and assemblies (BS 4011 : 1966).

Controlling dimensions in building (BS 4330 : 1968).

Accuracy in building (PD 6440 : Part 2 1969).

Arrangement of building components and assemblies within functional groups (PD 6432 : Part 1 1969).

Basic spaces for structure, external envelope and internal sub-division (PD 6444 : Part 1 1969).

Tolerances and joints. The derivation of building component manufacturing sizes from co-ordinating sizes (PD 6445 : 1969).

A guide for the use of the metric system in the construction industry (PD 6031 : 1968).

Building drawing practice (metric units) (BS 1192 : 1969).

A vital stage was reached with the publication of PD 6444 by the British Standards Institution in December, 1969. The primary object of this publication, which is closely related to BS 4011 and BS 4330, is to present data which will enable component designers and manufacturers working through the Technical Committees of the Institution to select limited ranges of modular building components for inclusion in metricated British Standards. It will also assist designers of dimensionally co-ordinated metric buildings and gives the reference information required by manufacturers to design components. Together these documents will allow very firm steps to be made towards the ultimate goal which is a position in which it will be practicable to employ dimensional co-ordination for all purposes within the construction industry.

The timely issue of the relevant British Standards and Codes of Practice over the five-year period allowed by the programme is of critical importance to the implementation of the construction industry's programme and those of its supplying industries. Summaries of progress made in the metrication of British Standards will be published by the British Standards Institution at six-monthly intervals. The Ministry of Housing and Local Government invited comments from the industry on proposed new rounded metric values to be used in the Building Regulations which were published in October, 1969. The Ministry and the Scottish Development Department expect the new metric Building Regulations to take effect early in 1972. The Board of Trade has consulted all concerned about the introduction of metric units of sale for sand and gravel. The industry proposes to change on 1st January, 1971. 12.6

Building Materials and Components

All the major industrial materials industries, referred to in Chapter 11, are suppliers of products to the construction industry. They have prepared their own programmes (see Appendix D). These phase in with the timing of the construction industry's programme. These programmes also depend upon the availability of revised metric British Standards for these products. 12.7

In addition, programmes are under consideration for the metrication of clay pipes, abrasives, asphalt, roofing felt, pitch fibre pipes, asbestos cement, clay floor and roof tiles, mineral and stone products and building components of timber, plastic and metal. The Brick Development Association has announced a new metric standard brick format which has been agreed by the brick industry. The new size of bricks has been available from 1st January, 1970. A number of manufacturers have made available concrete blocks in metric sizes to meet various requirements. The pottery industry, which supplies toilet and sanitary ware for the construction industry, is already experienced in metric working for the export market. The phased change over for equipment for home consumption is not expected to create any difficulty. Cement and ready-mixed concrete will change simultaneously to metric quantities and to decimal currency for all deliveries, from 1st January, 1971. 12.8

The construction industry cannot make all the changes required simultaneously. Nor is it practical to delay the metric design of buildings until new metric dimensions have been decided upon for all components and production has begun. For a limited time some imperially-dimensioned components will have to be fitted into new building work designed to metric controlling dimensions. Although over £1,000 million of construction work was being planned or designed in metric dimensions by the end of 1969 the range of dimensionally co-ordinated components available in metric sizes at that stage was very small. As the demands for these components increase manufacturers will switch to metric dimensions and, wherever practicable, to dimensionally co-ordinated metric sizes. The programme (PD 6030) provides for a period from 1969 to 1971 during which new work may be designed in either imperial or metric. After this period all new work should be designed in metric and the long-term benefits afforded by the simultaneous change to metric and the application of dimensional co-ordination should begin to operate. 12.9

Co-ordinated Designs

There is a natural tendency for those responsible for the design of construction projects to refrain from specifying co-ordinated metric components until they are certain that these are in production and will be available when required on the site. Some manufacturers of building components have already announced the availability of components in co-ordinated metric sizes. Manufacturers generally tend to be reluctant to embark on this production until they see an assured prospect of adequate and continuous orders. The public departments, local authorities and nationalised industry, as mentioned in paragraph 12.1, between them account for over 12.10

50% of the annual work load of the construction industry. This vast purchasing potential should enable these authorities to give a firm lead on the change to metric and the adoption of dimensional co-ordination. This should in turn lead to the large-scale production of dimensionally co-ordinated building components. Once the metric construction programme of the public sector gathers momentum in 1970 and co-ordinated components become more generally available, the private sector will follow the lead taken by the public sector in specifying these components and obtaining the benefits of rationalised building techniques.

Training

An important part of the whole process of the change is the training of the work force. The Construction Industry Training Board accepted a special responsibility for the contracting sector of the industry and has prepared a series of training aids for personnel at all levels. There is an urgent need for the re-training of designers and specifiers in working to controlling dimensions which must be the basis of dimensional co-ordination in the construction and allied industries. 12.11

The Demand for Metric Components

To help in appraising the rate at which the construction industry is changing to the metric system, the Government Departments concerned have published their design programmes, indicating the value of construction work in the public sector for each building type which is being designed in metric. These statistics will be brought up to date every six months and will be accompanied by progress reports on metrication from the Government Departments. There has up to now been no comparable comprehensive information for the private sector. The Royal Institute of British Architects is now collecting information on private schemes for publication from the first quarter of 1970. These two sources of information should help building materials producers and component manufacturers to make informed decisions on the market for metric materials, components and buildings. 12.12

It is important that the industry, and designers in particular, should be informed as soon as new metric components become available. To help this aim the Building Centres are compiling and publishing monthly lists of new products designed to metric dimensions. The publication of these lists is also encouraging a number of trade associations and firms to announce forward plans for the metrication of their products. 12.13

Civil Engineering

The civil engineering industry is working to the construction industry programme published by the British Standards Institution (PD 6030). New civil engineering work is being designed to standardised metric dimensions. A major portion of the work of the industry involves the construction of public highways and bridges on which substantial progress in metric design is being achieved. Technical information regarding the design of highways in metric was circulated in 1968 by the Ministry of Transport to Divisional Road Engineers, Directors of Road Construction Units, County Councils and other authorities concerned. Metric conversions for the existing specifications and other design manuals concerning highway and bridge construction have been issued and the Ministry is working on completely metric versions. New trunk roads and principal roads exceeding £800 million in value are already being designed in metric or are due to commence design in 1970 and the first tenders for all metric schemes will be invited this year. 12.14

The Costs and Benefits

Following a very great deal of intensive preparatory work, the construction industry and its allied industries have now irrevocably embarked on the change to metric. This is to be substantially completed for new work by the end of 1972. The unique opportunity of combining the change to metric with dimensional co-ordination can accelerate far-reaching advances in building design and technology. These changes should lead to 12.15

standardisation, mass production, and costs savings. The construction industry, however, has a very complex structure and is one of the most fragmented of industries. It is imperative that all sections of the industry should work in close co-operation, and meet their obligations under the programme. The programme caters realistically for all aspects and allows time for the change, but some hard work has still to be done. Initially, increased costs may be incurred through alterations to plant; combined stocking to meet continuing needs for both imperial and metric components during the period for the change; additional time and effort spent on sites; and on familiarisation with new units and revised technical reference books. Any reluctance to face up to the demands presented by the programme can only protract the transition period. This will increase the costs and defer the realisation of the financial benefits to clients which should result from the programme. A study is being undertaken by the National Federation of Building Trades Employers in liaison with designers, manufacturers and suppliers to provide a guide to the cost implications of going metric, including advantages to be looked for from the change, ways of obviating additional costs and areas where cost studies would be of value. As in other industries the effects on costs of the change will depend largely upon the approach adopted by the individual consultants and firms concerned. In the last resort there is no substitute for good design analysis and management.

12.16 The construction industry programme and progress towards metrication is now well forward. The intensive analysis work necessary is nearing completion. As metric construction work starts on site during 1970 problems of a technical and phasing character will inevitably arise, some of these from other industrial sectors of the economy. The transition period is planned to last until the end of 1972 by which time Britain should have an industrial capability for designing and executing completely metric dimensionally co-ordinated construction.

13: Engineering

The engineering industries embrace a wide range of specialist and general undertakings in the mechanical, electrical and electronic fields. They comprise more than 30 thousand establishments, over 80% of which employ less than 200 workpeople. This sector of the economy employs some three and a half million workpeople and has an annual turnover of £14,000 million. Metrication is a fundamental change for these industries. Precise measurement governs the great part of their activity. The implications of the new units of measurement have to be thought through because metrication can affect every aspect of a firm's activities. Thorough re-appraisal is essential if the opportunities presented by the change are to be grasped and the maximum benefits obtained. 13.1

The Basic Programmes

The engineering industries have benefited from the work done by the British Standards Institution, which published in July, 1968, an agreed metrication programme and guide for the engineering industries. The Institution has also produced sector programmes, which are consistent with the basic programme, for the electrical industry and the marine industry. These three programmes provide a basis on which constituent industries can develop more detailed plans. 13.2

Standards

For many products of the engineering industries the availability of metric standards is an essential prerequisite of the changeover. The preparation of these standards by the British Standards Institution, is not simply a matter of an arithmetical change from imperial dimensions to metric ones. Standards are being revised to meet current industrial needs, eliminating unnecessary variety and securing compatibility with agreed international standards where they exist. The task is large, but the target is to make available the essential standards in metric terms by the end of 1970. 13.3

The Individual Firm

The changes which individual firms in the engineering industries will have to undertake vary very greatly. They depend on the circumstances of the firm, the nature of its product, its present equipment and organisation, and the markets it serves. But all firms will, because of the metric change, be called upon sooner or later to review the design of their products. They have to consider whether it is timely to change the whole design or to change individual components of it. All this should be done in ways which will make possible the most economical use of materials to metric specifications and the incorporation of metric fasteners. For the simpler products it may be desirable to carry through complete metrication at one time, whereas for the most sophisticated products it may be better first to make them externally compatible with a metric environment and spread the changeover of the internal components. A firm's review of its activities should also cover purchasing policies for materials and components, the organisation of production, stocking policy and control, and, not least, a critical examination of marketing policies. This last is essential if only to make sure that any product changes are acceptable to customers. The timing of deliveries of metric designed products must not 13.4

conflict with the purchasers' own metric changes. Briefly, no aspect of a firm's activities should be exempt from critical scrutiny.

Government Purchasing Policies

13.5 The purchasing policies of central and local government and other public authorities are of particular importance to many engineering industries by reason of the size of their purchases and the influence they have on design and performance specifications. They can also give a firm lead to private purchasers. The importance of the Ministry of Defence and the Ministry of Technology as purchasers for some major sections of the engineering industries is very evident. The more widespread influence of the public corporations and of local authorities is sometimes less fully recognised. It is characteristic of all these purchasers that requirements are usually closely specified, British Standards being adhered to wherever possible. The lead being given by, for example, the Defence Departments, the Central Electricity Generating Board, and British Rail is encouraging, as is their readiness to enter into discussions about the metric change with their suppliers.

Classification

13.6 To carry out in a rational manner our task of co-ordinating the changeover plans for the various sectors of the industries it was necessary to develop a classification system which would place in a logical order the priorities of metrication, separate the essential from the detail, link the trade associations and British Standards involved, and enable us to monitor the plans being made. An outline of the classification system we have developed is set out in Figure 2. The items in each of the five levels shown have been related to the appropriate trade associations and the Board's staff has embarked upon a programme of visits to determine the detailed state of planning, to detect any critical gaps in this planning and to identify obstacles to the proposed changes.

13.7 Our preliminary survey of the progress made by the trade associations not surprisingly shows considerable variation in the state of programming between the diverse industries within the engineering industries.

13.8 In the mechanical engineering sector, most trade associations realise the need for detailed planning and have either their own metrication panel or are associated with committees of the British Standards Institution who are engaged on the revision of British Standards. About ten associations are also closely associated with the work which is being co-ordinated by the Engineering Equipment Users Association. Few, however, have yet carried their planning to the stage of publishing programmes.

Engineering Equipment Users Association

13.9 The Engineering Equipment Users Association, which comprises major industrial users of engineering equipment, materials and stores, agreed to give its members' suppliers a lead by planning members' purchasing programmes for metric equipment. It aims to produce a series of detailed procurement programmes which take account of the future availability of the essential metric equipment at economic prices. This initiative is of great significance for producers of process plant and their component suppliers.

Machine Tools

13.10 In May, 1965, the Council of the Machine Tool Trades Association accepted a recommendation that its members who manufacture machine tools should consider the introduction of the matric system for new designs. This would not only familiarise the design office and shop floor with the use of metric units but would start a gradual run-down of inch machines, thus reducing the servicing problems when the changeover was completed. Since then the industry has made considerable progress in the metrication of its designs and many firms are already manufacturing to metric drawings.

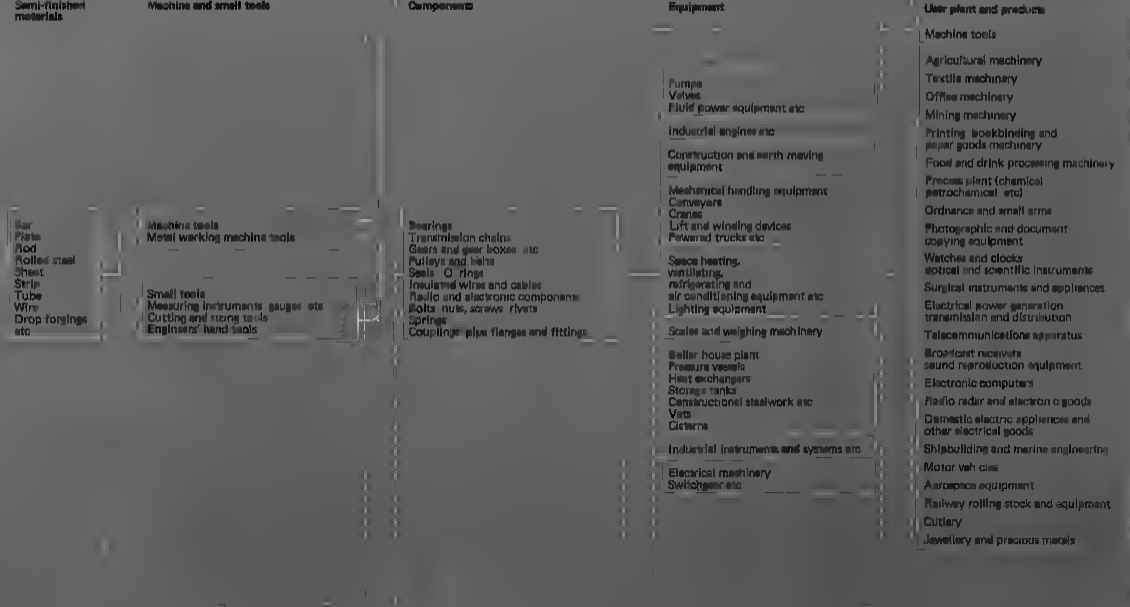
Bearings

13.11 The Ball and Roller Bearing Association is doing everything it can to

Figure 2

Engineering products: priorities for metrication

Note: at each level products are shown in order of the Standard Industrial Classification (revised 1968) published by HMSO



promote the use of metric bearings. Many types are already available. Standardised metric bearings, possibly excluding airframe and instrument precision bearings, will be available for all new applications to fit in with the engineering industries' metrication programmes.

Fasteners

The British Bolt, Nut, Screw and Rivet Federation has confirmed that it can meet the basic programme of the British Standards Institution and has produced a list of preferred sizes in both black and high tensile materials. A limited production of preferred sizes of high tensile metric fasteners is already available and the intention is that black fasteners will begin to be delivered by mid-1970. 13.12

Weighing Machines

Although the weighing machine industry is relatively small, its products are used throughout industry and trade from the raw material stage to the retailing stage, and by the whole transport system. The adoption of metric units will necessitate the conversion of many of the thousands of existing weighing machines. This is a complicated task, both for technical reasons and because the industry could not do all the work at once. We have, therefore, set up a Working Party, on which the industry is represented, to assess the problems. 13.13

Measuring Instruments and Equipment

The Scientific Instrument Manufacturers' Association and the British Industrial Measuring Control Apparatus Manufacturers' Association, have published metrication plans. Many products of the instrument engineering sector have been made to metric standards for a number of years. 13.14

Electrical Industry

The electrical industry, in which we include the electronic manufacturers, is well to the forefront in planning the changeover. That part producing rotating machines has been actively engaged for a number of years in aligning its standards with continental practice. Two trade associations, those concerned with cables and wires, and with covered conductors and strips, have published detailed programmes and began to implement them on 1st January, 1970. It seems unlikely that the other sections of the industry will publish separate programmes: individual firms are being left to prepare and announce their own programmes. The electronics part of the industry is largely dominated by the requirements of Government Departments and public corporations. These requirements will determine the rate of change by the manufacturers of capital equipment whose needs will set the pace for the component manufacturers. 13.15

Chemical Engineering

The metrication of chemical engineering equipment is being co-ordinated by the Engineering Equipment Users Association. The Chemical Industries Association has commended that programme to its members. 13.16

Shipbuilding

The basic programme for the marine industry provides for complete metrication by the end of 1972. In practice some British shipyards can already execute what are, in effect, metric orders, although some of the components may continue to be to imperial dimensions. Progress depends too on the availability in metric of further relevant British Standards which are due to be completed shortly. The initiative for complete metrication does not rest entirely with the shipbuilding industry itself because the prospective owners may lay down the specifications for their vessels and because the industry relies greatly on bought-in components. 13.17

Motor Vehicles

The motor industry, represented by the Society of Motor Manufacturers and Traders, has welcomed metrication in principle but does not envisage an immediate comprehensive change. The change, which has already gone some way, will be progressive as parts and components are redesigned. 13.18

Aircraft

The Ministries of Defence and Technology have jointly prepared an outline target programme for the introduction of the metric system throughout 13.19

the defence field, envisaging that all new designs should be metric and that this change should be substantially completed by 1976. The aircraft industry has agreed to make every effort to comply with this programme. However, until such time as the United States, the world's largest manufacturer and operator of civil aircraft, changes over to metric measurements, and because of the long life-span of aircraft, two sets of units are likely to be in use side-by-side for a long time to come.

Railway Equipment

13.20 The Locomotive and Allied Manufacturers' Association and British Rail have set up a joint metrication committee, with which the London Transport Executive is associated. The manufacturers of railway rolling-stock are aiming at adherence to the programme of the British Standards Institution.

Technical Impediments

13.21 We have not yet identified any insuperable technical impediments to the changeover in accordance with the published programmes. To many firms, mainly those with an export trade to the continent, production to metric standards is not new. But, as we have already indicated, the scale of the change within industry will create a wide range of managerial and commercial problems, such as the timely availability of metric materials and components, changes in specifications and production requirements, and revision of marketing data. It is, therefore, not so much the technical capability as the planning skills which will be tested by the changeover.

Problems of Small Firms

13.22 Large companies, generally, will have sufficient technical, financial and managerial resources to be able to devote some of them solely to planning the changeover and deal with it on a long-term basis. In addition, their purchasing requirements are usually large enough to ensure that suppliers will respond quickly to changes in demand. Many small firms, however, do not have these managerial resources. We are concerned about their rate of planning for the changeover. In addition they have two particular problems. First, the decision when to change is often not within their own control. A large percentage of the total purchasing resources of the industries is controlled by a small number of firms; 80% of the net output of the industries is attributable to 20% of the establishments. It is these large firms which set the pace. Small firms also depend very heavily on stockists of materials, fasteners and components. Stockists are not keen to carry dual stocks. The small firms are therefore at a disadvantage in obtaining metric products in the small quantities they would normally order. We have had preliminary discussions with the Confederation of British Industry about the problems of small firms, and we shall work with them to find solutions. Our present view is that a constructive attitude towards these problems by large firms is the main way of helping. Major producers and users can greatly ease the position by making their intentions widely known to those affected in good time.

Supply Difficulties

13.23 It is not our function to draw up the plans for the changeover in particular sectors nor is it our responsibility to ensure the availability of particular metric products. Complaints are bound to arise that the changeover is being held up because of delays in planning or by the lack of metric supplies. Where these are of general concern we will investigate them and bring those concerned together to work out solutions. For example we have been told that there are considerable difficulties in obtaining mild steel nuts and bolts to metric standards and that although the high tensile ranges are produced they are difficult to obtain and too expensive to use as alternatives. We are now investigating whether the initial needs of user firms can be aggregated to enable producers to meet the requirements on commercially satisfactory terms.

Converting or Replacing Machinery

13.24 A number of misleading statements have been made about the re-equipment problems of the engineering industries. Although most

existing inch-based machine tools can be used without modification to produce metricated components, some users will be faced with the need to convert their machines to a dual role or to metric working, and in some instances to replace them. Most machines can be readily converted, and conversion kits are now generally available. The decision whether or not to replace should be based on the economic factors involved, taking account of the age and type of the equipment, the accuracy required, the costs of conversion, and the disadvantages of retaining the existing equipment. Most firms will not be involved in major expenditures for re-equipment and adaptation. There will be exceptions, but generally re-equipment costs should not be an obstacle to metrication in the engineering industries. We are commissioning some research designed to show typical conversion costs for the broad range of cutting machine tools. Users who do decide that it would be advantageous to buy new machine tools should have no difficulty, subject to the normal lead times, in obtaining equipment designed for metric working.

The Pattern of Progress

Some engineering trade associations have made very considerable progress. Others have done little. One of our immediate tasks is to stir these into activity. We doubt whether the position shown by the enquiries we have made from trade associations represents the true pattern for the industry as a whole. Many firms, particularly the larger ones, have already made their individual plans for a phased changeover and many more are doing so now. This makes it difficult to judge the general state of preparation in the industry as a whole with any degree of certainty. 13.25

It would not be reasonable or practicable to seek information on the detailed state of planning within every firm in the engineering industries. We need to collect this information from a representative cross-section of the industries. We shall be asking trade and user organisations to help us in this task. 13.26

14: Printing and publishing

Paper 14.1

The Councils of the British Federation of Master Printers and the British Paper and Board Makers' Association have jointly agreed that the printing and paper industries should convert to metric as soon as possible. The industries were influenced particularly by the need to be able to offer a service in metric terms to the rest of British industry as it became metric. They have accordingly adopted the end of 1970 as the date by which the change should be made. The plans of the two industries are well advanced. Paper is already widely available in metric sizes and substances.

Book Sizes 14.2

The book production section of the British Federation of Master Printers and the Publishers Association have made recommendations for a rational revision of the existing specifications for the page size of books. If these recommendations are accepted by the industry they will be put into general practice by September, 1970.

15: Food and consumer goods

A wide range of industries provide goods for the consumer. The food, textile, clothing and footwear industries alone employ some two million people and have a net annual output in excess of £3,700 million. In addition, a considerable part of the output of the mechanical and electrical industries goes in satisfying the demand for consumer durables, including motor cars and domestic appliances. In total the consumer goods industries represent a major part of the economy. 15.1

No Comprehensive Programme

There is no comprehensive plan or timetable for the range of activities embraced by these industries. The diversity of production precludes a national basic programme such as that which the British Standards Institution has drawn up for some sectors. Some individual industries have already worked out timetables and in the pharmaceutical field the appropriate statutory regulations have provided that all prescriptions since March, 1969, should be dispensed in metric units. Detailed planning by sectors may result in greater coherence in timing the change than is yet apparent. 15.2

Taken as a whole, this sector appears unlikely to face any insuperable technical difficulties in metricating its production processes. Along with other industries and with commercial users, manufacturers will be concerned with the timely provision of metric weighing and measuring machinery, and with making the necessary changes without interrupting production significantly. In many of these industries, changes in packaging and labelling machinery may be needed. This will arise where new units of sale are adopted as a result of the rationalisation of package sizes as part of the changes accompanying metrication. 15.3

Reassuring Consumers

Most manufacturers in the consumer goods sector will, as part of their marketing policies, also have a responsibility for helping retailers of their products to reassure the buying public about the changes being introduced. In the case of imperial-dimensioned consumer durables, a reasonable spares life for the product will need to be provided when new metric designs are introduced, a problem not significantly different from that arising from normal design changes. It is in this whole sector of industry that the public will be most alert and, in the beginning at least, critical of the changes. 15.4

Food Manufacture and Packaging

For many food manufacturers the main change planned is in packaging. The British Standards Institution, through its Packaging Industry Standards Committee and related technical committees, has provided the forum for discussion of the proposed changes by all interested sectors, including manufacturers and consumers. At a series of meetings held in 1969, a wide measure of agreement in principle was reached on a model series of metric quantities, the application of which is now being considered in greater detail in individual industries. In the interests of pack rationalisation and with the introduction of new packaging standards, food manufacturers are considering changes in the weight of the contents of packaged foods, to provide a sensible metric series, for example, 125 grammes in substitution 15.5

of ¼ lb, 250 grammes for ½ lb, 500 grammes for 1 lb, and 1 kilogramme instead of 2lbs. Meanwhile, this rationalisation of the range of sizes of pre-packed foods and the capacity of liquid food containers has been under study by an official working group drawn from Government Departments in Germany, France and the United Kingdom with the object of agreeing on common European standards.

Units of Sale and Labelling Requirements

15.6 Many consumer goods, for the most part in the food and drink sector, are required by statute to be sold only in specified imperial quantities. Examples are pre-packed breakfast cereals, pre-packed butter and other fats, tea, cocoa, coffee, bread, milk, spirits and draught beer. Most foodstuffs and some other products are subject to marking requirements: the labels or containers must show the net weight or capacity measurement in imperial units. The labels of certain pre-packed foods are also required, by statute, to give an indication of the contents of the products in prescribed form.

Legislative Changes

15.7 Thus planning the change to the metric system for the food and drink sector is affected by legislative considerations, notably the provisions of the Weights and Measures Act, 1963, and the Labelling of Food Regulations under the Food and Drugs Act, 1955. In some cases manufacturing industry will also be affected by alterations in the basis of collection of revenue duty which will be required to be made to conform with metric measures. These changes will require appropriate provision in a Finance Act. The timing of these changes will call for close collaboration between the Government Departments responsible for the legislation and the relevant industrial sectors.

Textiles

15.8 Within the textile industry, it is necessary to distinguish between the spinning, weaving, knitting, bonding, finishing and retailing of cloth, and its distribution to a wide range of industrial users. The industry proposes to adopt SI units. Some parts of the industry have already embarked on firm programmes; certain synthetic fibres and woollen and cotton fibres are to be supplied in metric quantities to commercial users in 1971. There are no technical problems on the weaving side in the sense that significant changes in production machinery will be called for, but there is the task of revising and rationalising fabric structures. The industry as a whole is not yet ready to produce firm proposals for a complete change to metric units, but programmes are being drawn up in the different branches of the industry. The rate of change will depend in many instances on the phasing with plans of the consuming industries.

Carpets

15.9 The carpet industry is not faced with any great problem in marketing. Carpet measurements can be quoted in metric lengths and widths, the practice followed by the industry in appropriate export markets. On the manufacturing side, the conversion of production machinery will involve major technical changes, notably for the woven sector, for example, Wiltons and Axminsters, where some looms will require rebuilding. The industry is considering this aspect of the changes. In the meantime production of woven carpets in traditional sizes is likely to continue although widths may be quoted in centimetres, with appropriate revision of the size tolerances in the relevant British Standard (BS 3655 : 1963).

Bedding

15.10 The bedding industry hopes to go metric in January, 1971. Preparations began in 1967 and so far have centred on the opportunities presented for rationalising the product-range of mattresses. The new standard single and double mattresses will be 100 centimetres by 200 and 150 centimetres by 200. Two smaller sizes will also be retained at 85 centimetres by 190 and 135 centimetres by 190. The relevant British Standard (BS 1877 : 1963) is to be reviewed in this connection and the plans of the mattress makers are taking account of the timely availability of sheets, blankets and quilts, for the new proposed sizes.

Clothing

15.11 In the clothing sector the main problem for the industry is to agree a new basis of sizing. This is a problem of long standing and the industry hopes to use the switch to the metric system as an opportunity to co-ordinate and standardise the variety of symbols and sizes currently in use for garments of similar basic measurements. The centimetre will almost certainly be the unit of measurement on which these sizes will be based.

Footwear

15.12 An international scheme for metric sizing of footwear has already been agreed in principle. At the beginning of 1970 the industry was not ready to announce its timetable for the introduction of the revised system.

Durable Consumer Goods

15.13 Durable consumer goods form an important part of consumer expenditure. A change to metric dimensions is however unlikely to have any notable impact at the retail level as items are normally sold singly. Problems which may arise will be those for the manufacturer, notably where, as in motor vehicles, engineering components are assembled into a unit. Concern about the availability of spare parts is no different from that associated with normal changes in models. The furniture industry has gone some way already with plans to produce to metric dimensions. Here again, the consumer, buying in single units, is unlikely to be greatly affected except when buying modular or fitted furniture.

Hardware

15.14 This sector covers a wide range of goods some of which are sold by number and some by quantity; in these latter cases sales in manufacturers' packs are increasing. It is difficult to generalise for this diverse range of products but we have not identified any insuperable obstacle to the change to metric. Some products, however, such as nuts, bolts and other fasteners and plumbers' wares, will be required in imperial sizes for the repair of existing installations. Producers may have to meet this need even when most of their own production has gone over to metric specifications.

Future Programmes

15.15 We shall be concerned to explore this whole consumer goods sector of the economy in much greater depth, not least to be able to alert retailers and consumers to the timing of any changes which may affect them. Generally we would wish to see manufacturers bringing forward their programmes and introducing metric products into the market place at the earliest practicable date. Manufacturers should not hold back, waiting for everybody else. A massive change of a great number of products on a deferred M Day would mean a very difficult adjustment. With adequate preparation, progressive metrication will familiarise the general public with the changes.

16: Distribution and retailing

It is through the retail trade that metrication will make most immediate impact on the ordinary citizen. This is a major sector of the economy employing over two and a half million people and having an annual turnover of some £11,000 million. 16.1

Limited Use of Measurement

The chart (Figure 3, page 58) illustrates the trading units customarily used in the distribution and retail sectors. A great part of retailing does not involve the use of measure and very many goods are sold by number. Broadly, measurement in the shop only occurs in the food, drink, piece goods and tailoring trades. Even where measurement is relevant, a large proportion of goods sold are pre-packed and the retailer is not directly involved in measurement. The only areas where a significant amount of weighing and measuring takes place in front of the customers are in relation to fruit, vegetables, meat, fish, confectionery, draught beer, petrol and fuel. In practical terms therefore the problem of measurement in shops arises only for a relatively small part of total retail trade. At the technical level this consists mainly of dealing with measuring scales and other weighing machinery. Measuring lengths is not likely to give rise to any difficulty. 16.2

Metrication nevertheless raises the quite separate problem for the retailer of retaining the confidence of and reassuring the customer. The consumer already has some first hand experience with metric measure. In addition to pharmaceutical goods and cosmetics, many foodstuffs, mainly imported items, show weight or measurement in metric markings as well as in the statutorily required imperial marking. This practice is becoming more general. 16.3

Service Trades

For the most part those engaged in the service trades, for example, hairdressing, laundries, catering, repairs and garages, will have no problems in the changeover arising out of the nature of their trade apart from the sale of petrol, fuel oils and draught beer. They will, however, be affected by equipment and supplies which will reach them in metric form and this will have some effect on their operations. It would not be appropriate to urge this wide ranging sector of the economy to prepare programmes for metrication. The service trades will be able to respond to the changes as they take place. Suppliers should see to it that changes are notified in good time with the necessary background and servicing information. 16.4

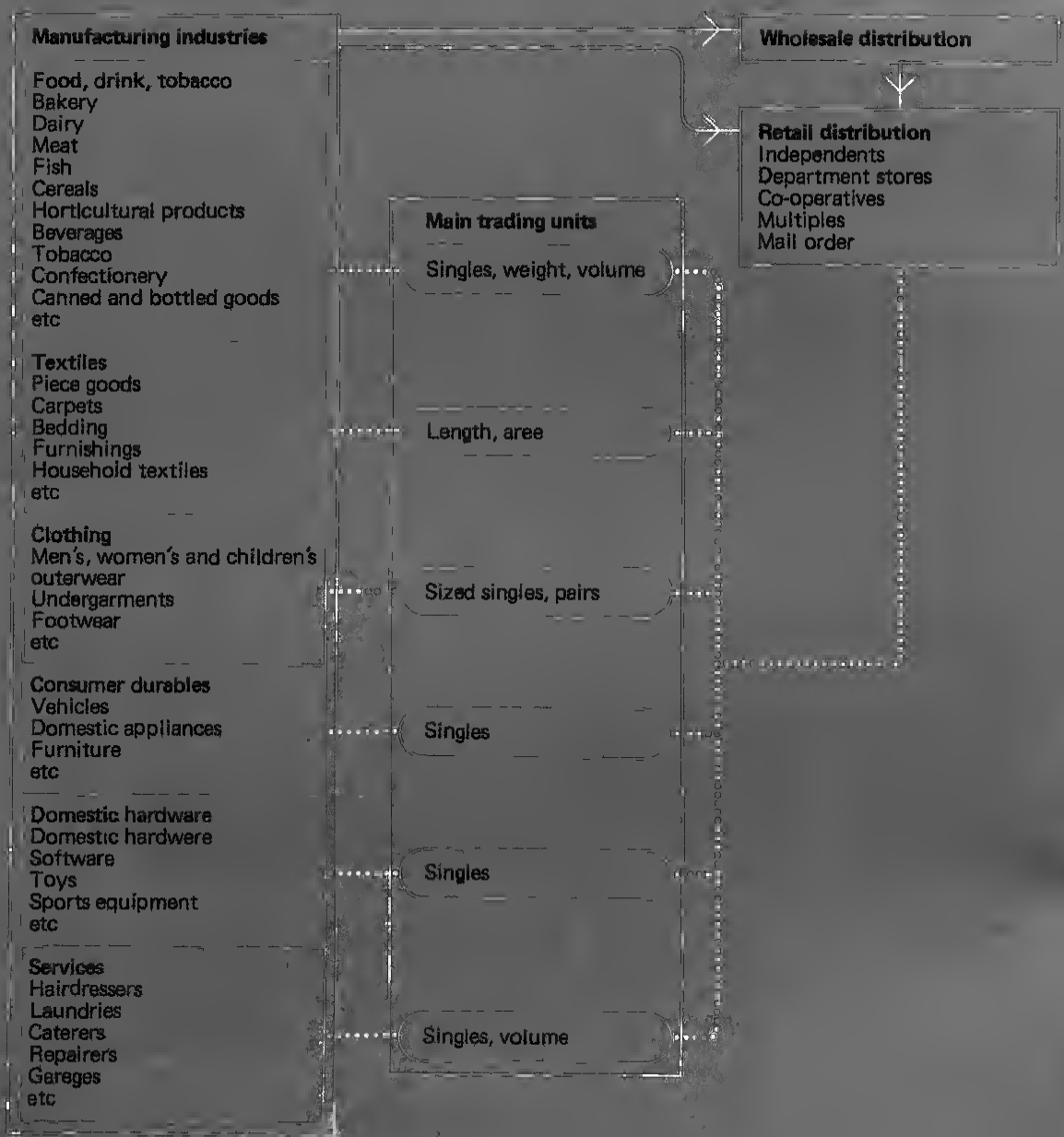
Reassuring the Customer

As the changeover makes more progress and moves into basic foodstuffs there will be misgivings and the public will initially need help from retailers and their suppliers in dealing with the changes. Timely publicity will be of the utmost importance. There will often be economic merits in changing to a larger unit of sale which would normally cost more. The public will wish to be assured that it is getting value for money in the change from the old imperial pack sizes to the new metric sizes. 16.5

The problem might be easier for retailers if there could be one M Day. In practical terms however, this will not be possible. Suppliers will be 16.6

Figure 3

Distribution and retailing: main trading units



changing over at differing times and this will involve retailers, for a time, in stocking and selling goods measured in both metric and imperial units. It has become clear that most retailers do not wish to become involved in metrication on any scale until after D Day in 1971. It is more than likely that this wish will generally be met. Manufacturers need time to prepare and implement their own plans for the changeover. Transition periods will be inevitable. These should be kept as short as possible and, in their preparations for the changeover, primary producers, manufacturers and retailers should make this a main objective. Although it will in all probability be some time before metric products reach the consumer on a wide front, all concerned should keep well in mind that the retailer and his staff will be expected to be a source of information and reassurance to the customar. Apart from the backing which manufacturers and wholesalers will clearly make it their business to provide in their own commercial interest, a good deal of effort will need to go into training for metrication in the retail sector. The Board is encouraged to learn that the Distributive Industry Training Board and the Hotel and Catering Industry Training Board, among other organisations, are considering how help can best be given when this becomes timely.

Possibility of Rapid Change

There may have been some overstating of the problems likely to confront the consumer during the period of change. Clearly there will be some initial reluctance. The elderly, in particular, may be expected to find greater difficulty in becoming familiar with the new units. In general the buying public should meet no great problem in getting used to them. The units are simple and few. The main ones are the metre, the kilogramme and the litre. They will quickly become the basis of everyday life for the man or woman in the street, in the home and in the workshop. The ground for this will ba prepared by a timely educational publicity campaign and there is no reason to suppose that the changes will not go forward smoothly and perhaps more swiftly in many sectors than at present may be thought likely. 16.7

There are, however, three commodities which present special features for the distributive and retail sector. These are petrol, beer and milk. Each is a basic product, familiar to the general public. The change to metric units of sale thus presents some significant issues for producer and consumer. 16.8

Petrol

At the retail end of their marketing line, the oil companies are planning to sell their products—petroleum and other liquid oil products—by the litre. The pace of the change is largely being determined by the need for conversion of many thousands of individual retail pumps. In preparation for decimalisation, all new price computing pumps installed since October, 1968, have convertible heads which will facilitate ready dispensing in litres when the changeover is made. The programme for changing the older types of pumps is planned to be concluded by 1974-75. In our view, the extensive use of petrol and oil by the general public, and in particular by the customer on the garage forecourt, presents an excellent opportunity for the introduction of metrication. The industry has accordingly been invited to explore the possibilities of bringing forward its programme dates for the change to litres as the unit of retail sale, and studies to this end are under way. 16.9

Beer

The brewing industry has a large proprietary stake in the licensed trade sector, in regard to sales of both draught and bottled beers. Separate provisions in the Weights and Measures Act, 1963, govern the two established ways of selling beer. Draught beer may currently be sold only in measures of one-third pint, one-half pint or in multiples of a half pint. Measurement at the point of retail sale is by stamped dispense meters or by stamped glasses. These would all have to be converted if draught beer is to be sold in metric units of the litre and its sub-multiples. 16.10

Bottled and canned beers, on the other hand, are subject under the Act 16.11

only to marking regulations. The size of the container is not regulated. The container must however carry an indication of the minimum net contents in imperial units. In addition, the quantity may, but need not, be shown in metric units: the practice of showing both measures is increasing. Bottling operations are geared to provide slightly more than the marked quantities, to ensure compliance with the marking regulations which are designed to protect the customer. Thus beer bottles, colloquially known as the "half pint" or "pint", usually bear labels indicating that the minimum net content is respectively 9⅔ fluid ounces or 19⅓ fluid ounces. By the same analogy the contents of a half-litre or litre container would not necessarily be marked with the "round metric" unit.

16.12 The Brewers Society have represented to us that to sell draught beer in round metric quantities would involve the industry in the expense of converting stamped dispense meters and the replacement of stamped glasses. Nevertheless we attach importance to basic products in every day demand being supplied in readily understood metric units of sale. We consider draught beer to be such a product and that the introduction of stamped glasses of round metric capacities is desirable. It remains to explore whether this can be achieved without undue costs.

16.13 In the case of bottled beers the Brewers Society have represented to us that to change to round metric quantities of sale would involve the expensive replacement of bottling machinery, bottles and associated equipment. We consider this change of less immediate importance than that for draught beer. On both issues we are continuing our discussions with the Brewers Society.

Milk

16.14 Under the provisions of the Weights and Measures Act, 1963, milk may be retailed only in prescribed imperial quantities namely one-third pint, one-half pint and one pint and multiples of one-half pint. The highly capitalised milk distributive industry is unique in its daily delivery service of a commodity subject to price control by the Government. The whole retail distribution system and pricing is very largely geared to delivery in the returnable pint glass bottle.

16.15 The industry has represented to us that a reduction in the capacity of the present units of sale to the half litre and lower metric measures would involve a considerable drop in sales of liquid milk and would thus seriously endanger the viability of the home delivery service. To replace the pint bottle with a litre size would involve the industry in unacceptably heavy capital expenditure in bottling plant and bottle replacement, from which it would draw no economic benefit. The result would therefore be a rise in costs.

16.16 Our view is that a round metric quantity as the unit of sale for milk is of special significance. It will bring the reality of metrication into the home and classroom more than any other change. There is the special consideration for milk that account has to be taken of the timing of metrication in agriculture. The introduction of metric units of sale for milk should coincide as far as is possible with other changes in retail trade in units of sale for other basic foods so that both professional caterers and home cooks can change readily to metric recipes. With these considerations in mind we are continuing our discussions with the industry to find technically feasible and economically acceptable solutions to the problems to which it has drawn our attention.

17: Industrial training

Training the whole of industry in the use of metric units appears on first examination a task of considerable magnitude and complexity. An analysis of the situation puts the exercise in perspective. The job to be done is essentially one of retraining within the individual firm. The first need is a realistic assessment by those responsible for training of the numbers for whom training is necessary and of the extent and timing of training required. 17.1

Analysing the Training Task

Most workpeople will require some background training near to the time when they are to be involved in the metric change. Training courses will normally embrace some knowledge of SI notation, the manipulation of relevant SI units, practice in metric calculations, retraining in the use of decimals and acquiring familiarity with metric dimensions in physical terms. The objective is to enable the workpeople to "think metric" on their job. By analysis of the types of measurements and the depth of knowledge required in each job, training needs can be defined to relate to a specific situation. In practice it is being found that people at all levels have gaps in knowledge. Particularly at risk are those who have learned their job by rule of thumb. For the majority, however, the amount of new knowledge and re-education needed is very limited and is rapidly acquired on the job. Once the analysis has been made, most firms will find that retraining for metrication is not the formidable task which a superficial long-range look may have led them to believe. 17.2

Role of Technical Colleges

Technical Colleges can play a useful part in industrial retraining. They could offer local industries intensive courses, by day or evening, which could quickly and economically meet their requirements, thereby assisting firms' own efforts. 17.3

The Industrial Training Boards

The Industrial Training Boards have an important role in connection with metrication. Since the problems of metrication vary from one industry to another, the contribution which the individual training boards can usefully make is not identical. The Construction Industry Training Board, for example, which has led the way in metric retraining, found itself with an exceptional problem. This stemmed partly from the decision of the industry to press forward with dimensional co-ordination and metrication together, and partly from the nature of the industry itself, with its very large proportion of vary small firms. The necessary training could not, for the most part, be handled by individual firms. Accordingly the Training Board took on a major function. In other industries, the role of training boards may be more modest. Some have criticised the Engineering Industry Training Board for not doing more to help the industry. The Training Board does not find its situation like that in the construction industry. The requirements of the engineering industries are different. The Engineering Industry Training Board is working out proposals designed to meet these distinctive and diverse needs. 17.4

With the agreement of the Department of Employment and Productivity, 17.5

a joint committee of Industrial Training Boards has been set up to look at the whole question of training for metrication. It is to be expected that the recommendations of the Committee, on which we are represented, will lead to a more co-ordinated approach by the industrial training boards generally. We have undertaken that the training boards will be kept fully informed of the changeover intentions of industry so that each training board can develop the right type of help to firms within its sphere when it is needed.

Government Training Centres

17.6 The Department of Employment and Productivity is responsible for the Government Training Centres. For a number of years the engineering trade syllabuses have contained some metric exercises. Plans have now been made for half the machine tools in the Centres to be metric by mid-1970 and this programme can be accelerated to keep pace with the rate of change in the engineering industry. The main effort of the Department has been on training in construction in the Centres. The curricula and training aids for the construction trades, such as drawings, wall charts, trade notes and instructional booklets have been examined and all terms and descriptions requiring amendment identified. Revised documents showing metric terms are being printed and will be available during 1970 for trainees in bricklaying, carpentry, woodworking, machine operating and plastering. To date about 25% of exercise drawings and layout drawings have been amended to metric and all construction trades have had some part of their exercise drawings so converted. All construction trainees will, thus, have some knowledge of metrication before they leave the Training Centre. The interest of trainees in metrication has also been stimulated by display of appropriate posters and at one Centre trainees have completed a metricated exhibition building.

18: The role of central and local government

The Roles of Departments

Government Departments have a major contribution to make to the general progress of metrication in the country as a whole. They have the primary responsibility of implementing the announced policy of the Government that obstacles to the change arising out of existing legal provisions will be removed. They must also ensure that public procurement policy keeps in step with progress in industry. Departments have a further responsibility as sponsors of particular industries or sectors of the economy. Most Departments realise the need to take internal action so that their own staffs are sufficiently familiar with metric units to deal with metric issues which arise in the course of their work and to be able to work with metric units with the same facility as that with which they now use imperial units. 18.1

The Need for Legislative Changes

The removal of legislative obstacles involves a large number of changes in existing provisions. Some of the changes will require amendments to Statutes but most arise in subordinate legislation, which can be more readily amended. It is the responsibility of Government Departments, in direct consultation with the interests affected, to identify the changes in legislation which will be necessary and to monitor the progress of the amending provisions. Our function is the more limited but critical one of identifying those situations where the progress of metrication would be seriously impeded in the absence of timely legislative changes and of ensuring that the responsible Department is responding to the situation. 18.2

The evidence we have seen so far indicates that progress is satisfactory and that the momentum will be maintained. Work by Departments on the Bill to make provision for the necessary amendments to Statutes is being co-ordinated by the Ministry of Technology and we are assured that steady progress is being made. The whole field of subordinate legislation has been reviewed. In some cases, where individual industries had progressed to the point where amendments to existing regulations had become necessary, appropriate amendments have been made by Ministers under existing powers. 18.3

The Metrication Bill

The Ministry of Technology is currently preparing proposals, in consultation with Departments and other interests concerned, for the content of a general metrication Bill for introduction by the Minister as soon as possible. We understand that the present expectation is that the Bill will provide for the authorisation and definition of units of measurement which are to be used for all purposes in this country; for the removal of certain barriers to metrication in existing legislation; and for constituting the Metrication Board as a statutory body. 18.4

The Weights and Measures Act, 1963

One statute which has a very wide application to metrication is the Weights and Measures Act, 1963. The Board of Trade has wide powers to make changes by subordinate legislation. These include the provisions which require a wide range of goods to be sold only in specified quantities. Under these powers the Board of Trade has made regulations to allow the 18.5

pharmaceutical industry to use certain additional metric weights and to amend the prescribed tolerances for petrol pumps to allow the use of equipment designed for simple conversion to the metric system. It is conducting consultations, which the Act requires, preparatory to making changes in a number of other Orders and regulations relating to the units of sale of certain commodities, the provision of additional sizes of metric weights and measures and the conversion of existing weighing and measuring equipment. It has already had discussions with several industries about transitional problems. There are some provisions of the Act which can only be changed by legislation. An extension of the Board of Trade's delegated powers is necessary and will be included in the provisions of the general metrication Bill.

Other Legislative Needs

18.6 We have already in previous chapters referred to the legal changes which are required arising from the metrication of transport; the changes in mining and in the units of sale of all forms of fuel; the agricultural programme; the development of metric dimensionally co-ordinated construction; the packaging of food and its labelling. Generally we have received assurances from Departments that necessary preparatory work is in hand.

The Need for Reassurance

18.7 There is, nevertheless, a good deal of concern in industry that all the necessary legislative changes may not be made early enough. The fear is that progressive industries or sectors will be hindered in planning and carrying out their programmes. It is important that the Government should remove this unease. An early and comprehensive announcement on the measures they propose to take to make sure that the progress of metrication will not be impeded by legislative obstacles would be a great reassurance to industry and give momentum to the change.

Public Procurement Policy

18.8 Departments are following the announced policy that public procurement will keep pace with the progress of metrication in industry. There are, nevertheless, signs of some variations in the application of the policy. Some Departments are keeping well up with progress made by industry but others seem to be moving more slowly and cautiously. We are conscious of a widespread, and growing, feeling throughout industry that the Government should take a more positive line and that Departments ought to keep well abreast of progressive producers. We support this view. We think it important that Government policies should be seen to be acting positively to increase the momentum of change. Such a change of emphasis by the Government could have a significant influence on the rate of progress of metrication: and the quicker the rate of change, the sooner the benefits and the lower the costs.

The Sponsoring Role

18.9 Those Departments who act as sponsors to the Government of particular industries and services can make a helpful contribution to our work. They can encourage their industries to establish or strengthen appropriate machinery to promote consultation and co-ordination of the metrication programmes of individual organisations and sectors. We regard it as essential that all Departments holding responsibilities for sponsorship should take all possible opportunities to make evident their interest and concern about the progress being made in particular sectors. They may have opportunities too to cite instances of the benefits reaped both by individual firms and by the economy as a whole. Enthusiasm, or the lack of it, in a sponsor Department tends to be reflected throughout the industries and services with which it deals.

Civil Service Training

18.10 All Departments are conscious of the need to ensure continued efficiency in operations in the new environment which metrication is bringing. Appropriate guidance on matters of concern to the Civil Service as a whole has been, and will continue to be, given by the Civil Service

Department. Individual Departments are developing their own training arrangements appropriate to the needs they foresee.

The Wide Ranging Roles of Local Authorities

18.11 The principal role of local authorities in relation to metrication is as buyers of goods and services on a large scale. Local authorities spend in total more than £5,000 million per annum, more than 30% of total public expenditure. It is therefore essential that the procurement policy of local authorities, in common with the procurement policy of central government, should promote the progress of metrication. The services for which local authorities are responsible are many and varied, including planning, highways, housing, education, police, fire and the personal social services. All these will be affected by metrication. The responsibility of local authorities for weights and measures inspection and the enforcement of statutory provisions is particularly relevant to the change in industry and distribution. Local authorities also have to make adequate provision for the training of their own officers so that local services will be able to make the change-over efficiently. The timing of the change will vary from service to service within local government.

Co-ordination of the Change in Local Government

18.12 The main problem is one of co-ordination. There are at present over 1200 separate authorities in England alone. Although the projected reorganisation of local government should greatly simplify this structure, the key decisions on metrication and most of the programme of change itself will already have been implemented before reorganisation has taken effect.

18.13 Two factors, however, greatly reduce the intricacy of the problem. Each type of authority is represented by its own association and we are in touch with these associations. Moreover, although all local authorities have a considerable measure of independence, they are subject to a number of central government controls and influences. The two most significant are the approval required for borrowing money for capital projects and the issue of departmental circulars. The need to obtain approval for borrowing enables Government Departments to ensure that local authority projects keep in line with Government policy. Through the issue of circulars, Government Departments give guidance and advice on such matters as departmental policies and on timetables for implementing the change to the metric system. As a result there is a much greater measure of coherence than would appear. On the other hand a comprehensive local government metrication programme would not be a sensible objective because of the variety of local government activities and their frequent overlapping with those of industry and commerce. The paragraphs which follow describe the present general position on metrication in some of the more important local government activities and services.

Construction Responsibilities of Local Authorities

18.14 Local authorities are responsible for a major part of public authority construction, notably housing, schools and roads. Each Department concerned with local government construction projects has laid down a timetable for the change to metric, to which local authorities must adhere in order to obtain financial approval to carry out their projects. As a result of this policy, the change to metric in local government construction is already under way. Of projects which entered the design stage in 1969, nearly 30% of housing schemes and about 58% of schemes on principal roads were expected to be in metric quantities. The available figures on major educational schemes suggest that the change is slower here, while still according with the general programme.

18.15 The Ministry of Housing and Local Government has produced, as a basis for consultation with local authorities and others, a draft of revised (metric) Building Regulations. The Scottish Development Department will shortly put in hand the formal procedure for amending its Regulations.

Both Departments have given guidance to local authorities on procedures to be adopted until agreed new regulations are brought into effect.

Road Signs

We referred earlier (paragraphs 5.8 and 5.9) to the consideration the Ministry of Transport is giving to the problem of converting road signs. Local authorities will have a substantial part to play in making the necessary changes. 18.16

Health and Welfare Services

The school health service will have a particular problem in arranging for the conversion, adaptation or replacement of weighing machines and measuring rules used in the inspection of schoolchildren. As metrication reaches the retail sector, public health inspectors will be involved in relation to food and drugs legislation because of their responsibilities for consumer protection. 18.17

Local health and welfare authorities are in touch with elderly and handicapped people and with voluntary organisations which are concerned with the interests of such people. They will need to ensure that their staff are ready to deal with the problems of metrication for these groups and will wish to invite the voluntary organisations to consider how those whose interests they seek to protect could best be helped. This will only be timely, however, when metrication on a significant scale enters into day-to-day life. 18.18

Police and Fire Services

In the police and fire services accuracy and reliability are crucial, in the one case because of the need for maximum efficiency and safety in fire-fighting, and in the other because of the possibility that measurements of one sort or another may be a vital factor in evidence given in court. Careful attention will need to be given to the replacement or adaptation of equipment. Staff training will also be equally important in both services. 18.19

Weights and Measures Inspectorate

Weights and measures is one field in which local government has a vital part to play in ensuring the success of the change-over. The inspection of weighing and measuring apparatus is a necessary stage in the change to metric units in manufacturing, in transport services, and in retailing. 18.20

We have already mentioned the action which Government Departments are taking to ensure that all necessary legislative changes are made in due time (paragraphs 18.2 to 18.5). Central government will also be concerned to ensure that guidance is given to the Inspectorate on the specifications for all necessary equipment, including the full range of local and working standards. The Board of Trade has already issued several specifications and others are in preparation. It will be important that local authorities should order their working standards in good time. 18.21

There will undoubtedly be increased pressure of work in weights and measures departments because of the need to test and either stamp or restamp weights, weighing machines, petrol pumps and other measuring equipment throughout the country. The Board of Trade is considering the problem and seeking means of avoiding unnecessary work or inconvenience to traders and to the public. 18.22

Education and Training

Local education authorities will have a considerable part to play in achieving the change-over throughout the educational system. This subject is dealt with in detail in Chapters 4 and 17. 18.23

A considerable amount of work is already being done throughout local government to prepare for and to implement the change to the metric system. Through the local authority associations, we will keep in touch with progress. The most essential feature is that local authorities should continue to receive adequate guidance and support from Government 18.24

Departments which are responsible for making the major policy decisions on metrication and which through their financial control largely determine the resources which local authorities can deploy.

19: Units of measurement

As part of our general information function, we have a responsibility for making the metric system of units widely known. We are not, however, the authority determining the definition of units, or their application and use, or the legal provisions relating to them. Our understanding is that responsibility for defining the units to be used in the United Kingdom rests with the Minister of Technology, advised by the Advisory Committee on Legal Units of Measurement and that the main responsibility for defining the application and use of measurement units in industry rests with the British Standards Institution, subject to the legal provisions in force at the time. The legal definitions of some units and standards of measurement are found in the provisions of the Weights and Measures Act, 1963, which also regulates their use in trade. The responsibility for the legal provisions governing the use of units in industry is widely dispersed in the Government and involves most departments to a greater or less extent. 19.1

Use of the Centimetre

In the early weeks of our existence, we quickly found that there was a great deal of confusion throughout almost every section of our society on whether some metric units could any longer be used. In particular, there was widespread belief that the centimetre was not to be used at all. This caused a good deal of consternation. A number of school teachers expressed the view that it was impossible for them to devise sensible curricula because they did not know what they should teach. There was also a good deal of critical correspondence in the daily press. 19.2

The main cause of the confusion was lack of understanding about the relationship between the International System of Units and the recommendation issued by the International Standards Organisation that "the use of prefixes representing 10 raised to a power which is a multiple of 3 is especially recommended". This means that where this applies only prefixes which denote steps of 1000 would be used, for example, for length the kilometre, the metre and the millimetre. This recommendation was in fact addressed to those engaged in applied technology and was not intended to be extended for general usage in science or in trade and commerce or other purposes. The misunderstanding about the appropriate application of this recommendation became widespread because of the publicity which the publications of the British Standards Institution and the Construction Industry Training Board attracted; they, being addressed to technical audiences, emphasised the recommendation of the International Standards Organisation. 19.3

We have been at pains to remove these misunderstandings by all means open to us, including, in particular, speaking engagements at public meetings and contributions to articles in the Press. We have been greatly helped by booklets issued by the Royal Society and the Schools Council, which gave clear guidance to teachers. Our task was also eased by the announcement by the Minister of Technology on 24th July, 1969, of the appointment of the Advisory Committee on Legal Units of Measurement. The Minister took that opportunity to state that the Government accepted the SI as a 19.4

basis for the changeover to the metric system.

Every Day Metric Units

19.5 To help to widen understanding of the position we have issued a short leaflet which describes the SI units which will be used in everyday life. A list of these everyday units will be found on the back cover. We have also prepared a further publication, which explains the development of the International System and the elements which constitute the International System of Units, which the Government has accepted as the basis for the metric change. We shall continue with our efforts, using all appropriate means to extend understanding of SI.

Decimal Notation

19.6 A related matter for which we have no responsibility but on which the public has looked to us for guidance is the notation to be used with metric units. The traditional British practice has been the use of the point as the decimal marker and the comma to separate groups of three digits. In Europe the comma is widely used as the decimal marker and groups of three digits are separated by a space. This raises a troublesome issue. Strictly it does not arise out of metrication but it becomes more pressing in the context of the change. There is at present no authoritative ruling on the practice to be followed in the United Kingdom. Indeed, there is no common practice even among Government Departments apart from the expression of monetary amounts for which the point as the decimal marker and the comma to separate groups of three digits is laid down as approved practice. For scientific purposes the Royal Society recommends the decimal point and the space between groups of digits. The Parliamentary Secretary to the Ministry of Technology stated in the House of Commons on the 10th November, 1969 (*Hansard*, Vol. 791, No. 10, Col. 19-20), "Decimal notation is a standardisation problem: in this country it is the responsibility of the British Standards Institution and world-wide of the International Standards Organisation." The British Standards Institution is discussing with the Ministry of Technology the desirability of a widespread enquiry by independent investigators into possible forms of notation and their relative advantages. Beyond this, even when an agreed United Kingdom position has been reached, is the further stage of reaching as wide a measure of international agreement as is attainable. Meantime there is some urgency in establishing a common Government practice, and we are glad to be assured that this is receiving immediate consideration by officials.

20: The costs and benefits of metrication

Metrication is a fundamental change made with the aim of gaining major benefits. It is rare indeed that substantial benefits can be gained in any field of activity without initial costs. Metrication is no exception. Debates about cost have generated far more heat than light. A number of extravagant guesses have been made, most of them directed to the total cost to the economy. Because sensational statements make news, such guesses hit the headlines and are repeated until in time they come to be treated as official estimates. We cannot emphasise too strongly that there is no official estimate of the total cost of going metric nor of the financial gains to be expected. 20.1

National Cost

It is fanciful to attempt any sort of estimate of the cost of metrication to the economy as a whole. Partly because of the nature of the problem and partly because any attempt to assess the cost of metrication involves taking a view of a very varied collection of future decisions, it is difficult to estimate what future expenditure will be incurred, even within an individual undertaking. The costs of metrication are in many cases inextricably intertwined with the cost of much wider changes. This would make it impossible, even retrospectively, to determine what proportion of expenditure should be attributed to metrication itself and what to other changes being made at the same time. 20.2

Cost to Firm

Individual undertakings can make approximate estimates of the costs they will incur. Such costs will in most cases not be wholly attributable to metrication alone but it is not important for the individual enterprise to make a precise attribution of these particular costs for budgetary and control purposes. Estimates which we have seen indicate that, with good management, the amount involved in changing to metric production need not be at all daunting. For example, the British Federation of Master Printers has estimated costs in the printing industry of the order of ten shillings to fifteen shillings per head of staff. A planning estimate by a firm manufacturing light engineering products puts the cost at 0·5% per annum of annual turnover for a period of three to four years. An estimate by another engineering firm foresees a cost of a little over 1% of annual turnover, for a period of about three years. 20.3

We do not claim that these estimates are typical; in so diverse a field, nothing could be. But they are responsible estimates made in particular instances. And while there may be cases in which costs will be greater, these estimates do at least serve to suggest that the fears that have been expressed of very high costs of metrication over a very wide area are mistaken. 20.4

It is a very different matter to attempt to project such estimates of the cost of change, made by individual industrial organisations for planning purposes, so as to construct an estimate of the overall cost to the economy as a whole. Metrication involves an enormous variety of undertakings. There are also wide variations in needs and circumstances as well as in accounting techniques. It is risky to generalise even from one firm to another, let alone 20.5

to attempt to extend such generalisations to manufacturing industry as a whole, much less to the national economy.

Assessment of Benefits

20.6 Those who promote and publicise estimates of overall cost seem to be drawn from those who are opposed to metrication. They have not exposed the basis of their assessment of total cost. Moreover, we know of no attempt to produce a serious estimate of the countervailing benefits, a necessary condition to an economic assessment of the change. The benefits are potentially very large. It is, however, even more difficult to evaluate them and to determine how much is properly attributable to metrication alone and how much to metrication combined with other changes, such as rationalisation, variety reduction and reduction in stock holdings. These changes should bring an all-round increase in efficiency, leading to greater opportunities to expand sales both at home and abroad. We can look for improvements in education at all levels through simplification of mathematical instruction in all its varied applications. Unlike the costs, which are once for all, the benefits continue indefinitely.

Costs of Inaction

20.7 Nor is that all. The decision to change to the metric system involves not simply the question of weighing the costs against the benefits and deciding that the latter exceeded the former (although that was the conclusion both of industry and Government). The more significant question is whether the nation truly had an option to stay imperial without suffering serious disadvantages and incurring substantial costs simply as a consequence of resisting change. The answer is clear. The costs of staying imperial in a world which, in this respect, would have left us far behind, are potentially vast, increasing and persisting: British industry would be less efficient; a competitive edge would be lost; and there would be repercussions on the standard of living. We would have burdened ourselves with a continuing handicap.

20.8 Fortunately, the die is cast. The task now is not to hold inquests into the possible overall cost of changing or not changing to metric but to ensure that the change is made in ways which extract the greatest possible gains for the economy, by keeping the costs to the minimum and by securing the maximum benefits.

20.9 Metrication is a substantial investment in efficiency. It cannot be achieved without cost and we would not suggest otherwise. But we are confident that, given purposeful direction at every level, including Her Majesty's Government, the investment can pay big dividends. This is a challenge, both to management and to the work force. The opportunity must not be wasted.

21: Informing the public

Our Objectives

Our task is to make the metric system intelligible, acceptable and familiar throughout the country. The change to metric depends for its success not only on the wisdom of the plans for making the changes but on effective communication with those who will be affected by them. Achieving this communication is primarily the responsibility of the enterprise, the public authority, or the industry responsible for the initiatives. We may need to stir them to make this effort. We have established effective links with others already engaged in promoting metrication. Information campaigns are being planned by Government Departments dealing with areas of their responsibilities in which metrication is particularly significant. The Industrial Training Boards intend to increase their effort. The Trades Union Congress has emphasised the necessity that workpeople should be informed of the changes which will affect them. The Confederation of British Industry is continuing to devote considerable resources to making known the changes which are taking place as are some of the larger Trade Associations. Our responsibility is to give direction to these efforts and to complement them as necessary. A special responsibility is to keep the general public informed of the changes which will affect them. 21.1

Changing the Focus

The most imminent changes are those taking place in the materials industries, in construction, in engineering and in education. It is therefore with these sectors that we are most immediately concerned. The urgent need is to make sure that there is a sufficient exchange of information about what changes there will be and the timing. Those affected, particularly those in industry, must have time to consider how they will be involved and what response they should make to the impending changes. It is not until somewhat later that those industries and services which are of most direct concern to the retailer and the consumer will begin using metric units of weight and measure extensively. It is at this stage that most of our resources will be directed to making sure that the general public is familiar with the pending changes. We are alert to the present need to remove misunderstanding and groundless alarm and to respond promptly to requests from the public generally for information about the changes which are already taking place. For the immediate future, however, our efforts will be concentrated on the industrial scene and on the planning of changes in agriculture. 21.2

Our General Information Service

As in other aspects of our work we have built upon the previous efforts and preparations of others, notably the Ministry of Technology and the British Standards Institution. Our first task was to provide an information service for the press, radio and television organisations and trade associations, as well as for educationalists and the general public. More than a million posters, booklets, leaflets and news releases have been sent out during 1969. We have been greatly encouraged by the interest and co-operation of journalists and broadcasters. Metrication has featured increasingly in a wide range of national and regional newspapers, trade journals and magazines, and in radio and television programmes. As metrication gains momentum and as planning gives place to actual changes, this 21.3

interest should grow.

Exhibitions and Conferences

21.4 Our exhibition participation has been built on the preparatory work of the Ministry of Technology. We mounted a touring exhibition in Birmingham, Sheffield and Glasgow. This was designed primarily to give guidance on planning metrication to management in manufacturing industries. It attracted the attention of the press, broadcasters and the general public in all three cities. Modest poster, direct mail and advertising campaigns helped to produce good audiences. Local organisations took the occasion to organise associated seminars, study groups and meetings, which extended the impact. At these exhibitions and at meetings and conferences elsewhere we have done what we could to stimulate and lead discussion on what metrication means and how to set about securing advantage from the change. In all this, we have been greatly encouraged by the initiative shown by industrial organisations.

Films

21.5 We have produced three colour films in a series *Keys to Metrication,* initiated by the Ministry of Technology. In these, as in other aspects of our information work, we have relied greatly on the experience and resources of the Central Office of Information. These first films concentrate on the engineering industries, and are addressed particularly to managers, designers, production engineers and inspectors, who have the main responsibilities for preparing for the changes in these industries. During 1970-71 these films will be extensively promoted. To increase their effectiveness booklets amplifying and supporting the aspects which the films demonstrate are now being prepared.

Preparing for the Future

21.6 While the information programme now in hand seems likely to be adequate for 1970, we are faced with the need in this year to plan a much more extensive effort for 1971 and 1972, when the metric change will have gathered speed and involvement will be more widespread. We must try to ensure that the industrial changes take place in an environment which is informed and sympathetic. Both employers and trades unions are agreed that the changes in industry cannot be wholly successful if they are divorced from like changes in the day-to-day life away from the work bench. Likewise the tasks of teachers in schools and those engaged in industrial training will be made easier when it is evident that the adoption of metric measurement is not a classroom discipline but a major change affecting every aspect of national life.

22: Conclusions

1 The time is past for argument about the merits of the decision to go metric. The decision was in no sense hasty. It was well-considered and supported by lengthy investigation. The immediate need is to maintain momentum and to speed the rate of change. A great deal of preparation has taken place over the last five years and the United Kingdom will be substantially a metric country before 1975.

2 Most of the world is now metric or has already decided to make the change. The United States of America is still considering the pros and cons. There is little doubt that before the end of the seventies the whole world will have decided to adopt the metric system.

3 The progress achieved in the United Kingdom since 1965 is notable. A great deal of the credit belongs to the British Standards Institution, which has the continuing responsibility for producing metric standards. The timely publication of these standards is essential to the success of the changeover.

4 The Metrication Board has a major role as co-ordinator for the whole complex of metric change. The development of metrication programmes for particular sectors, however, is the responsibility of the appropriate industrial or service organisation. It is here that trade associations and professional institutions have a notable part to play.

5 We now have a comprehensive picture of the stage reached by the end of 1969. Surveys of the progress to date have not revealed insuperable difficulties but there are some awkward problems. One which is widespread is the timely conversion of weighing machines. To this we are giving special attention.

6 Metrication is a fundamental change intended to secure major benefits. There have been a number of attempts to put a figure on the total cost of the changeover. This is a subject which attracts those opposed to the decision to go metric. We do not consider it practicable to produce a meaningful estimate of the total cost for the national changeover. The costs of metrication are inseparable from those of the other changes which accompany the adoption of metric units. Wise planning can keep the costs down, but some are inescapable. The costing of the changes is part of the management job within the individual undertaking. When planning and preparation have been thoroughly done, costs can be kept down by making the transition phase as short as practicable. The positive objective is to maximise the benefits which, unlike the costs of the change, will persist.

7 The education system will necessarily have the major responsibility for training the younger generation to become thoroughly familiar with the metric system and its uses. An effective start has been made. We are

paying particular attention to the availability of metric text books. Some increased expenditure on books and equipment will be inescapable. "Resources must be found; this expenditure is well worthwhile because of the economies of effort resulting from concentration on a coherent system of measurement which will meet all needs as they arise both in school and in the world outside."

8 The training and retraining of those who have left school will fall mainly on their employers. The size of this task should not be over-estimated. The training should be adequate and properly timed. The professional institutions, the technical colleges, the Industrial Training Boards, the Government Training Centres and the broadcasting organisations can support and supplement these efforts. The co-operation of the trades unions and their membership is indispensable to the success of the change because work people will be affected in a variety of ways.

9 The changeover in transport involves a great many services. The main need is to synchronise the change for the movement of freight. We have made arrangements with the representatives of the transport interests concerned to work out a co-ordinated approach and to agree upon a common date for the changeover. The changeover will also need some changes in Customs and Excise requirements for the purposes of United Kingdom external trade statistics and the Tariff. The date of the changeover must allow time for the necessary legislative changes. We have suggested as a target date January, 1972. Speed limits will be in metric terms in 1973 and plans are being made for the appropriate changes in road signs. We agree that it is right to concentrate efforts on the quick conversion of speed limit signs, and to leave the conversion of purely informative road signs to be spread over a longer period.

10 In the fuel and power industries we regard the main outstanding issue to be agreement on common units for the measurement of power and energy for all types of fuel and fuel burning equipment. Users should be able readily to compare the performance of fuels and equipment. This possibility is virtually excluded if the units of measurement used continue to differ.

11 Preparations have been made for surveying land in metric units, for relating valuations to metric areas and for the use of metric units for land planning. The production of metric Ordnance Survey maps started in 1969. The programme provides for their steady extension to cover the whole country.

12 The Metrication Committee established by the National Farmers' Union in collaboration with representatives of the other interests has made rapid progress. Generally the organisations concerned are well equipped to carry through the necessary changes. We see no reason why a target of 1972-73 should not be used for planning purposes by farmers and horticulturists. As detailed plans are developed it may not prove possible to implement all the necessary changes within this two-year span and some may extend through 1974.

13 The White Fish Authority and the Herring Industry Board have jointly set up a working party to look into rationalisation, including the use of metric units, in the handling and marketing of fish.

14 We are satisfied that the planning for metrication in forestry is well forward and that implementation of the plans is proceeding smoothly.

15 Industrial materials are of critical importance to the changeover in user industries. Uncertainty about the preferred metric sizes of a material and

its availability in metric quantities could be serious for all sectors using that material. While producers of industrial materials are giving a timely lead there are still awkward programme gaps to be filled, notably for some specifications of steel. The situation is generally encouraging and we expect it to develop substantially in 1970.

16 The construction industry was one of the first to embark on intensive preparation for the change to the metric system. The broad programme for the comprehensive introduction of dimensionally co-ordinated metric design and construction was published by the British Standards Institution in February, 1967. It is a formidable task to integrate the efforts of this very fragmented industry. Moreover, the industry is dependent on a large number of suppliers of materials and components. Close working relations between Government Departments and the construction industry together with the large volume of public sector work now being designed in metric should ensure that the change, for all new work, is substantially complete by the end of 1972. Our concern is that similar progress should be made in the design of work for the private sector.

17 Progress in the engineering industries is, in general, encouraging, particularly in the larger companies which account for 80% of total production. Some of the smaller firms have shown notable initiative. We are, however, concerned about the problems of small firms. The studies which we are commissioning into the extent to which machine tools need to be converted and the most cost-saving way of carrying out such conversions should be of particular benefit to the smaller engineering firms. The British Standards Institution has provided a broad programme for the engineering industries. We are now concerned to ensure that the detailed programmes are prepared by individual sectors.

18 The paper and printing industries together with publishers have worked out proposals for going metric. These will be put into practice before the end of 1970.

19 The needs of consumers are met by a very wide range of manufacturing and service industries for which there is no comprehensive co-ordinated programme. This is probably not attainable but it should be possible to develop programmes for sectors within the broad group as well as for particular industries. We have not identified any insuperable difficulties in the way of the changeover. Packaging and weighing machinery present the main technical problems. The distinctive responsibility of producers will be a special effort to explain to their retailers the changes they make.

20 It is in the retail shop that metrication will make its widest and most direct impact on the ordinary citizen. A careful examination shows that the problems are not as large or as complex as is sometimes thought. Most goods are sold by number and not by weight. A great many others are pre-packed. Only a limited range of commodities is now weighed out in the shop in front of the customer. Nevertheless it is the retailer who will be called upon to reassure the individual customer. If he is to succeed, the retailer will need help from manufacturers, from trade associations, from the education service, from the Distributive Industry Training Board, and from our own information and publicity campaigns. One M Day for the retail trade is not practicable. There will have to be transition periods which should be as short as possible. The longer the notice and the clearer the guidance the less troublesome these will be. We are devoting special attention to the problems of retailing milk, beer and petrol in metric quantities.

21 Central Government has a major responsibility to ensure the success of its

metrication policy. Local authorities can make a substantial contribution. Government Departments have already given encouragement and help to those engaged in carrying through the change. We are in no doubt that the time has come when the Government should make an early and comprehensive announcement about the action which it intends to take in furtherance of its metrication policy. The statement should describe how the Government proposes to ensure that metrication will not be impeded by legislative obstacles. It should bring together and express more vigorously the ways in which public procurement will be used to foster metrication. It might also set out the steps Departments are taking to prepare themselves to work in a metric Britain. It should make clear that Departments will be actively supporting the efforts of the progressive elements and that the pace will not be determined by the more reluctant. Local authorities are responsible for a wide range of services which enter into the daily life of citizens. They are also very substantial purchasers. They can therefore exert a powerful influence on the rate of change.

22 We have a major task of making the metric system intelligible, acceptable and familiar throughout the country. At this stage in the changeover we are concentrating on an adequate flow of information to industry. At the same time, we are keenly aware of the need to remove any misunderstandings among the general public. At the outset we found some confusion about what metric units would be used. We have taken every opportunity to clear this up, for example, we prepared a simple statement on everyday units which is being widely distributed. We have put in hand a very broadly based information campaign. We have mounted a number of exhibitions, produced films and issued a large number of leaflets. We shall expand this programme in 1970. The appetite for information is growing rapidly. We need to ensure that when the industrial changes take place everyone affected is informed and receptive. We shall rely heavily on the co-operation of others but we shall have to ensure that our direct effort expands to match the pace and spread of metrication within the national life.

Appendix A

The Board - membership and terms of reference

Membership

Lord Ritchie-Calder, CBE, MA (Chairman)
The Earl of Bessborough (Deputy Chairman)
G. Bowen, CB, CMG (Diractor)
M. A. Abrams, PhD
H. J. Cruickshank, CBE, CEng, MIMechE, FIOB, FBIM
D. H. Darbishire
A. G. Dawtry, CBE, TD, LLB
J. M. Ferguson, BSc, CEng, FIEE, FIMechE
P. Hanley
E. F. Knight, CEng, MIEE, MBIM
Professor M. L. McGlashan, PhD, DSc, FRIC
Sir Thomas Padmore, GCB
F. Lincoln Ralphs, PhD, MSc, LLB, DipEd
Mrs. Ailsa Stanley, JP

Secretary to the Board: F. H. Whitaker, CMG, OBE

Terms of reference

1. Tha Board shall facilitate the transition from the use of existing systems of weights and measures in the United Kingdom to the metric system on the assumption that the end of 1975 should be the target operative date for all provisional programmes, with the qualification that, if this date proves to be unreasonable for any particular sector, the programme for that sector may aim at an earlier or later date.

2. In particular the Board are required:

(a) to examine in consultation with such organisations and persons as the Board consider appropriate the problems involved in the transition;

(b) to advise the responsible Minister on the implications of the change to the metric system in each sector of the economy and, so far as practicable, the costs and other considerations involved, including any legislative changes which may be judged necessary;

(c) to make generally available information and advice on the co-ordination of timetables and programmes for the change in the various sectors of the economy;

(d) to furnish to any enquirer information and to publish, whether by advertisement or otherwise, such information as the Board may think useful for familiarising the public with the metric system;

(e) to ensure that the relevant educational interests are kept fully and continually informed of plans and progress for metrication;

(f) to make investigations and surveys for obtaining information relevant to the performance of any of the duties of the Board;

(g) to give such assistance to the Government as Departments may request in connection with the preparation or amendment of any legislation needed to permit the wider use of the metric system; and

(h) to give such other assistance as the Government may require in the implementation of Government policy on the adoption of the metric system.

3. The Board shall report annually to the Minister of Technology on the performance of their duties in a form suitable for publication.

Appendix B

Steering Committees – membership and areas of responsibility

Steering Committee for the agriculture, forestry, fisheries and land sector

Membership

The Earl of Bessborough (Chairman)
J. B. C. Carr, TD
R. B. Caws, FRICS
D. H. Darbishire
G. C. Eddie, BSc, CEng, FIMechE, MIMarE, MInstR
Sir Roger Falk, OBE, FIMC
H. M. Glass, MSc, PhD, FRIC, FInstPet
Sir David Lowe, CBE, DSc, FRSE, SHM
J. G. Quicke, MA
F. Lincoln Ralphs, PhD, MSc, LLB, DipEd

Assessors:
J. Hensley, P. G. M. Riding — Ministry of Agriculture, Fisheries and Food
B. G. S. Ward — Department of Agriculture and Fisheries for Scotland

Secretary to the Steering Committee: D. F. Reed

Area of Responsibility

The sector is defined in terms of the Standard Industrial Classification as that embraced by:

Order I	Agriculture, Forestry, Fishing
Order XXIV	Land Management (MLH B63 only)

Steering Committee for the distribution, food, and consumer goods industries

Membership

G. Bowen, CB, CMG (Chairman)

S. Abbott, MIMechE
M. A. Abrams, PhD
Miss E. Ackroyd, MA
J. B. C. Carr, TD
H. R. Coleman, JP
A. G. Dawtry, CBE, TD, LLB
J. Forbes, FCA
H. M. Glass, MSc, PhD, FRIC, FInstPet
A. B. L. Horsman, ACA
Julian Lee
M. Mackintosh, MA, FCA
J. H. Maude-Roxby, ACIS
B. Proffitt
Mrs. Ailsa Stanley, JP

Assessors:

J. R. Catford	Ministry of Agriculture, Fisheries and Food
E. J. Lindley	Board of Trade

Secretary to the Steering Committee: Miss E. W. McCallum

Area of Responsibility

These industries are defined in terms of the Standard Industrial Classification as those embraced by:

Order III	Food, Drink, Tobacco
Order V	Chemicals and Allied Industries (MLHs 272, 273, 275 and 278 only)
Order XIII	Textiles
Order XIV	Leather, Leather Goods and Fur
Order XV	Clothing and Footwear
Order XIX	Other Manufacturing Industries
Order XXIII	Distributive Trades
Order XXVI	Miscellaneous Services

Steering Committee for the education and industrial training sector

Membership

F. Lincoln Ralphs, PhD, MSc, LLB, DipEd (Chairman)
Sir William Alexander, LHD, PhD, MA, MEd, BSc, FCP
Miss E. E. Biggs, BSc, MA, HMI
J. Brosgall
S. G. Carlow, MBE, ACIS
G. B. R. Feilden, CBE, MA, CEng, FIMechE, FRS
R. Sibson, MA, HMI
Professor M. L. McGlashan, PhD, DSc, FRIC
G. Hall, BSc
P. Hanley
F. W. Kellaway, BSc, FIMA, DipEd
S. Maclure, MA
Miss R. Part
Damè Muriel Stewart, DBE, MA, MEd.

Assessors:

B. A. Smith	Department of Employment and Productivity
D. J. Brazier, DSM	Department of Education and Science
T. Crippin, HMI	Scottish Education Department

Secretary to the Steering Committee: M. Moss

Area of Responsibility

The sector is defined in terms of the Standard Industrial Classification as that embraced by:

Order VII	Printing and Publishing (MLHs 485, 486 and 489 only)
Order XXV	Educational Services (MLH 872 only)

This Steering Committee's responsibilities include all levels of education as well as industrial training and retraining.

Steering Committee for the engineering industries

Membership

E. F. Knight, CEng, MIEE, MBIM (Chairman)
C. Brewer, CEng, FIProdE, MIEI, MIMC
J. M. Ferguson, BSc, CEng, FIEE, FIMechE
Maj. Gen. J. M. L. Gavin, CB, CBE
P. Hanley
P. A. Hill, BSc, CEng, MIMechE, MIProdE, MIOM
Professor M. L. McGlashan, PhD, DSc, FRIC
Sir Thomas Padmore, GCB
R. A. Parkin, BSc, CEng, FIMechE, FIProdE
E. Whiteley

Assessor:
R. E. L. Cleaver Ministry of Technology

Secretary to the Steering Committee: W. A. Methven

Area of Responsibility

These industries are defined in terms of the Standard Industrial Classification as those embraced by:

Order VII	Mechanical Engineering (except construction equipment industries MLHs 336 and 341)
Order VIII	Instrument Engineering
Order IX	Electrical Engineering
Order X	Shipbuilding and Marine Engineering
Order XI	Vehicles
Order XII	Metal Goods not elsewhere specified

Steering Committee for the fuel and power sector

Membership

Professor M. L. McGlashan, PhO, DSc, FRIC (Chairman)
Mrs. Ailsa Stanley, JP

Secretary to the Steering Committee: J. A. Harrison

Area of Responsibility

This sector is defined in terms of the Standard Industrial Classification as that embraced by:

Order II	Mining and Quarrying
Order IV	Coal and Petroleum Products
Order XXI	Gas, Electricity and Water

Steering Committee for the industrial materials and construction industries

Membership

H. J. Cruickshank, CBE, CEng, MIMechE, FIOB, FBIM (Chairman)
M. D. Clarke, ARIBA
A. W. Cleeve Barr, FRIBA, FIOB
G. B. Colbridge, BSc(Eng), MICE
A. S. Ellett, FIOB, MBIM
A. G. Dawtry, CBE, TD, LLB
E. W. Greensmith, FCGI, BSc, CEng, FIMechE, MIChemE
H. C. Hine
K. M. Wood, BA, FCA

Assessor:
G. H. Wigglesworth ARIBA, AADipl Ministry of Public Building and Works

Secretary to the Steering Committee: J. A. Harrison

Area of Responsibility

These industries are defined in terms of the Standard Industrial Classification as those embraced by:

Order V	Chemicals and Allied Industries (MLHs 271, 274, 276, 277 and 279 only)
Order VI	Metal Manufacture
Order VII	Construction Equipment Industries (MLHs 336 and 341 only)
Order XVI	Bricks, Pottery, Glass, Cement, etc.
Order XVII	Timber, Furniture, etc.
Order XVIII	Paper Industries (MLHs 4B1, 4B2, 4B3 and 484 only)
Order XX	Construction

Steering Committee for the transport and communication industries

Membership

Sir Thomas Padmore, GCB (Chairman)

J. H. Buscombe, BSc, AIB, FREconS
J. M. Ferguson, BSc, CEng, FIEE, FIMechE
E. F. Knight, CEng, MIEE, MBIM
J. MacNaughton Sidey, DSO
K. C. Turner, CBE
Col. J. S. Vickers, BSc(Eng), MIEE, AMBIM

Assessors:

D. N. Byrne	Board of Trade
J. A. L. Gunn	Ministry of Transport
A. M. Houghton	Ministry of Technology

Secretary to the Steering Committee: A. G. Kennedy

Area of Responsibility

These industries are defined in terms of the Standard Industrial Classification as those embraced by:

Order XXII Transport and Communication

Information Policy Committee

Membership

Lord Ritchie-Calder, CBE, MA (Chairman)

M. A. Abrams, PhD
G. Bowen, CB, CMG
Norman Collins
Michael King
Noel Newsome, OBE, MA
John Scupham, OBE, MA
Donald Shepherd, OBE, FRSA, MA
Mrs. Ailsa Stanley, JP

Assessors:

F. D. Bickerton CBE, FIPR	Central Office of Information
H. S. Winterbourne	Ministry of Technology

Secretary to the Committee: Norman Stone

Chairmen of the Steering Committees are entitled to attend meetings of the Information Policy Committee.

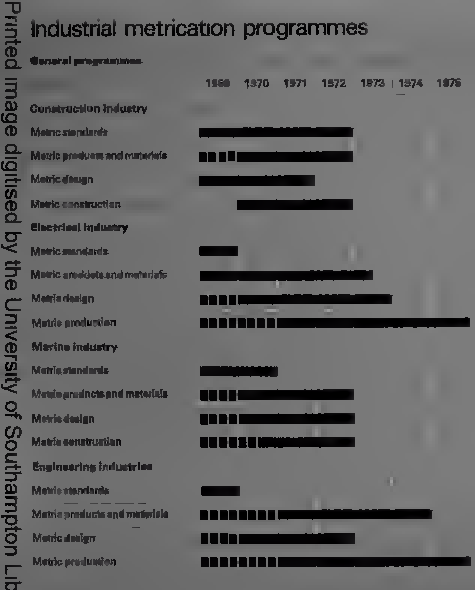
Appendix C

Financial statement

Nine months ending 31st December, 1969

	£
Salaries	54,000
Administrative Expenses	3,000
Accomodation and Rates	51,000
Publicity and Public Relations	53,000
Total	£161,000

Industrial metrication programmes



Legend

Build up

A planned changeover period during which both current imperial and new metric sizes/quantities should be available. Subsequently metric work will predominate

A changeover period has been recommended but the precise timing and duration will be decided by individual companies.

The industry is planning to go metric on a particular date and no prolonged changeover period is foreseen.